

Student: _____
Date: _____

Instructor: Alfredo Alvarez
Course: Math 1314 Sullivan Coreq

Assignment: _____
finalm1314kellymathboss32midterm

1. Solve the quadratic equation by factoring.

$$t^2 - 2t = 15$$

The solution set is { }.
(Simplify your answer. Use a comma to separate answers as needed.)

Answer: -3, 5

$t^2 - 2t - 15 = 0$ rewrite
 $(t + 3)(t - 5) = 0$ (Good)
 $t + 3 = 0$ OR $t - 5 = 0$
 $t + 3 - 3 = 0 - 3$ OR $t - 5 + 5 = 0 + 5$
 $t = -3$ OR $t = 5$

ID: Quick Check PF.4.9

2. Solve the equation.

$$7x^3 + x^2 - 63x - 9 = 0$$

The solution set is { }.
(Simplify your answer. Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

Answer: $-\frac{1}{7}, -3, 3$

synthetic division:
 $7 \quad 1 \quad -63 \quad -9$ possible last = $\frac{-9}{7}$
 $7 \quad 22 \quad 3 \quad 0$ rem | $+9, +3, +1$ possible
 $\frac{+9}{7}, \frac{+3}{7}, \frac{+1}{7}$ possible
 $7x + 1 = 0$ → $7x = -1$ → $x = -\frac{1}{7}$ (Answer)
boxed answer: $3, -3, -\frac{1}{7}$

ID: PF.4.39

3. Find the distance $d(P_1, P_2)$ between the given points P_1 and P_2 .

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

$$P_1 = (6, 1)$$

$$P_2 = (-1, 5)$$

$$d = \sqrt{(6 - (-1))^2 + (1 - 5)^2}$$

$$d = \sqrt{(6 + 1)^2 + (1 - 5)^2}$$

$$d = \sqrt{7^2 + (-4)^2}$$

$d(P_1, P_2) =$ _____
(Simplify your answer. Type an exact answer, using radicals as needed.)

Answer: $\sqrt{65}$

$$d = \sqrt{49 + 16}$$

$$d = \sqrt{65}$$

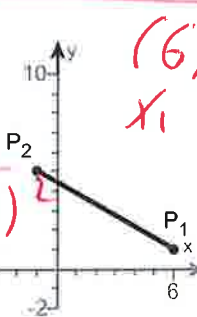
ID: F.1.21

$$d = 8.062257748$$

$$d = 8.06$$

Round

← Always sleep at night EAT only in the day.



$(6, 1)$ and $(-1, 5)$
 $x_1 \quad y_1 \quad x_2 \quad y_2$



4. Find the midpoint of the line segment joining the points P_1 and P_2 .

$$P_1 = (2, -6); P_2 = (4, 6)$$

The midpoint of the line segment joining the points P_1 and P_2 is _____.

(Simplify your answer. Type an ordered pair.)

Answer: (3,0)

$$\begin{array}{ccc} (2, -6) & \text{and} & (4, 6) \\ x_1 & y_1 & x_2 & y_2 \end{array}$$

ID: F.1.39

$$\text{Midpoint} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$\text{Midpoint} = \left(\frac{(2) + (4)}{2}, \frac{(-6) + (6)}{2} \right)$$

$$\text{Midpoint} = \left(\frac{2+4}{2}, \frac{-6+6}{2} \right)$$

$$\text{Midpoint} = \left(\frac{6}{2}, \frac{0}{2} \right)$$

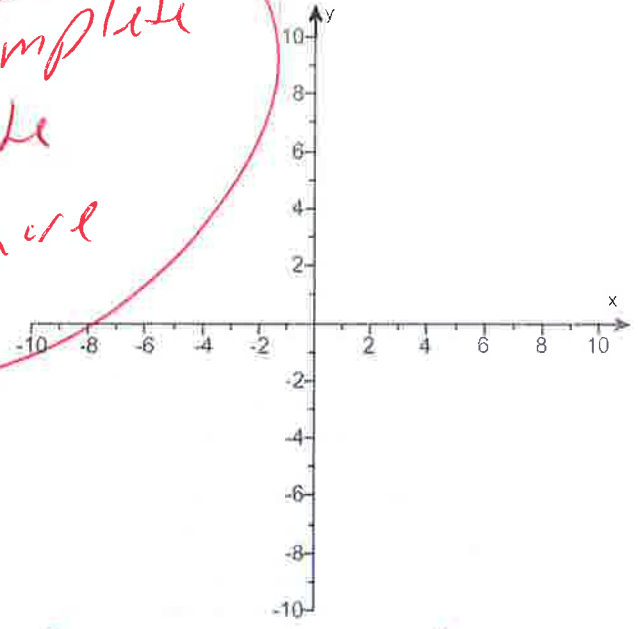
$$\text{Midpoint} = (3, 0)$$

5.

For the equation $x^2 + y^2 - 4x - 8y - 16 = 0$, do the following.

- (a) Find the center (h,k) and radius r of the circle.
- (b) Graph the circle.
- (c) Find the intercepts, if any.

Complete the Square



(a) The center is _____.
(Type an ordered pair.)

The radius is $r =$ _____.

(b) Use the graphing tool to graph the circle.

(c) Find the intercepts, if any. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The intercept(s) is/are _____.
(Type an ordered pair. Use a comma to separate answers as needed. Type exact answers for each coordinate, using radicals as needed.)
- B. There is no intercept.

$x^2 + y^2 - 4x - 8y - 16 = 0$
 $x^2 - 4x + y^2 - 8y = 16$ rewrite

B. There is no intercept.
 $x^2 - 4x + (\frac{1}{2}(-4))^2 + y^2 - 8y + (\frac{1}{2}(-8))^2 = 16 + (\frac{1}{2}(-4))^2 + (\frac{1}{2}(-8))^2$

Answers (2,4)

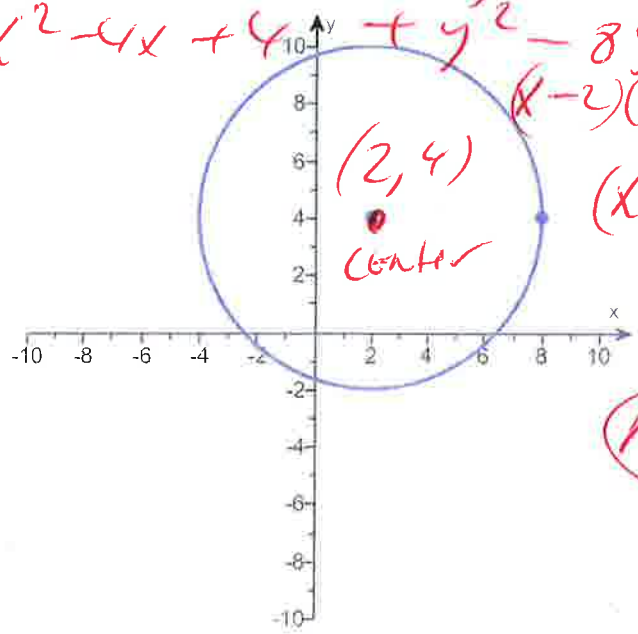
6 $x^2 - 4x + (-2)^2 + y^2 - 8y + (-4)^2 = 16 + (-2)^2 + (-4)^2$

$x^2 - 4x + 4 + y^2 - 8y + 16 = 16 + 4 + 16$

$(x-2)(x-2) + (y-4)(y-4) = 36$

$(x-2)^2 + (y-4)^2 = 36$

✗



Center = (2, 4)

Radius = $\sqrt{36} = 6$

A. The intercept(s) is/are $(2 - 2\sqrt{5}, 0), (2 + 2\sqrt{5}, 0), (0, 4 - 4\sqrt{2}), (0, 4 + 4\sqrt{2})$.

(Type an ordered pair. Use a comma to separate answers as needed. Type exact answers for each coordinate, using radicals as needed.)

ID: F.4.27

6. Find the domain of the function.

$$f(x) = \sqrt{4x - 28}$$

The domain is _____. (Type your answer in interval notation.)

Answer: $[7, \infty)$

ID: 1.1.59

$$f(x) = \sqrt{4x - 28}$$

$$\text{set } 4x - 28 \geq 0$$

$$4x - 28 + 28 \geq 0 + 28$$

$$4x \geq 28$$

$$\frac{4x}{4} \geq \frac{28}{4}$$

$$x \geq 7$$



$$[7, \infty)$$

formula

domain

$$f(x) = \sqrt{Ax + B}$$

$$\text{set } Ax + B \geq 0$$

7. For the given functions f and g , complete parts (a)-(h). For parts (a)-(d), also find the domain.

$f(x) = 5x + 2; g(x) = 9x - 8$

(a) Find $(f + g)(x)$.

$(f + g)(x) =$ _____ (Simplify your answer.)

$(f+g)(x) =$
 $(5x+2) + (9x-8) =$
 $5x+2+9x-8 =$
 $14x-6 =$

Domain
 $(-\infty, \infty)$

What is the domain of $f + g$? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The domain is $\{x |$ _____ $\}$.
(Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

B. The domain is $\{x | x$ is any real number $\}$.

$(f-g)(x) =$
 $(5x+2) - (9x-8) =$
 $5x+2-9x+8 =$
 $-4x+10 =$

Domain
 $(-\infty, \infty)$

(b) Find $(f - g)(x)$.

$(f - g)(x) =$ _____ (Simplify your answer.)

What is the domain of $f - g$? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The domain is $\{x |$ _____ $\}$.
(Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

B. The domain is $\{x | x$ is any real number $\}$.

$(f \cdot g)(x) =$
 $(5x+2)(9x-8) =$
 $45x^2 - 40x + 18x - 16 =$
 $45x^2 - 22x - 16 =$

Domain
 $(-\infty, \infty)$

(c) Find $(f \cdot g)(x)$.

$(f \cdot g)(x) =$ _____ (Simplify your answer.)

What is the domain of $f \cdot g$? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The domain is $\{x |$ _____ $\}$.
(Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

B. The domain is $\{x | x$ is any real number $\}$.

$(\frac{f}{g})(x) =$
 $\frac{f(x)}{g(x)} =$
 $\frac{5x+2}{9x-8} =$

$9x-8=0$
 $9x-8+8=0+8$
 $9x=8$
 $\frac{9x}{9} = \frac{8}{9}$

Domain $x \neq \frac{8}{9}$

(d) Find $(\frac{f}{g})(x)$.

$(\frac{f}{g})(x) =$ _____ (Simplify your answer.)

What is the domain of $\frac{f}{g}$? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The domain is $\{x |$ _____ $\}$.
(Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

B. The domain is $\{x | x$ is any real number $\}$.

$(f+g)(x) = 14x - 6$
 $(f+g)(4) = 14(4) - 6$
 $(f+g)(4) = 56 - 6$
 $(f+g)(4) = 50$

(e) Find $(f + g)(4)$.

$(f + g)(4) =$ _____ (Type an integer or a simplified fraction.)

$(f - g)(x) = -4x + 10$
 $(f - g)(2) = -4(2) + 10$

(f) Find $(f - g)(2)$.

$(f - g)(2) =$ _____ (Type an integer or a simplified fraction.)

$(f - g)(2) = -8 + 10$
 $(f - g)(2) = 2$ ✓✓

(g) Find $(f \cdot g)(3)$.

$(f \cdot g)(3) =$ _____ (Type an integer or a simplified fraction.)

$(f \cdot g)(x) = 45x^2 - 22x - 16$

(h) Find $\left(\frac{f}{g}\right)(1)$.

$\left(\frac{f}{g}\right)(1) =$ _____ (Type an integer or a simplified fraction.)

$(f \cdot g)(3) = 45(3)^2 - 22(3) - 16$

$(f \cdot g)(3) = 45(3)(3) - 22(3) - 16$

$(f \cdot g)(3) = 45(9) - 22(3) - 16$

$(f \cdot g)(3) = 405 - 66 - 16$

$(f \cdot g)(3) = 339 - 16$

$(f \cdot g)(3) = 323$ ✓

Answers $14x - 6$

B. The domain is $\{x \mid x \text{ is any real number}\}$.

$-4x + 10$

B. The domain is $\{x \mid x \text{ is any real number}\}$.

$45x^2 - 22x - 16$

B. The domain is $\{x \mid x \text{ is any real number}\}$.

$\frac{5x + 2}{9x - 8}$

$\left(\frac{f}{g}\right)(x) = \frac{5x + 2}{9x - 8}$

$\left(\frac{f}{g}\right)(1) = \frac{5(1) + 2}{9(1) - 8}$

$\left(\frac{f}{g}\right)(1) = \frac{5 + 2}{9 - 8}$

A. The domain is $\left\{x \mid \underline{\quad x \neq \frac{8}{9} \quad}\right\}$.

(Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

50

2

323

7

$\left(\frac{f}{g}\right)(1) = \frac{7}{1}$

$\left(\frac{f}{g}\right)(1) = 7$ ✓✓

ID: 1.1.67

8. Find the difference quotient of f ; that is, find $\frac{f(x+h) - f(x)}{h}$, $h \neq 0$, for the following function. Be sure to simplify.

$$f(x) = x^2 - 7x + 3$$

$$\frac{f(x+h) - f(x)}{h} = \underline{\hspace{2cm}}$$

Answer: $2x + h - 7$

ID: 1.1.83

$$f(x) = x^2 - 7x + 3$$

$$\frac{f(x+h) - f(x)}{h}$$

$$\frac{(x+h)^2 - 7(x+h) + 3 - (x^2 - 7x + 3)}{h} =$$

$$\frac{(x+h)(x+h) - 7x - 7h + 3 - x^2 + 7x - 3}{h} =$$

$$\frac{x^2 + 1xh + 1xh + h^2 - 7x - 7h + 3 - x^2 + 7x - 3}{h} =$$

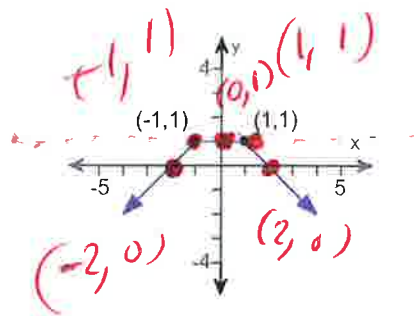
$$\frac{x^2 + 2xh + h^2 - 7x - 7h + 3 - x^2 + 7x - 3}{h} =$$

$$\frac{2xh + h^2 - 7h}{h} =$$

$$\frac{2xh}{h} + \frac{h^2}{h} - \frac{7h}{h} =$$

$$2x + h - 7 =$$

9. Determine whether the graph is that of a function by using the vertical-line test. If it is, use the graph to find
- its domain and range.
 - the intercepts, if any.
 - any symmetry with respect to the x-axis, y-axis, or the origin.



Is the graph that of a function?

- Yes
 No

If the graph is that of a function, what are the domain and range of the function? Select the correct choice below and fill in any answer boxes within your choice.

- A. The domain is $(-\infty, \infty)$. The range is $(-\infty, 1]$.
 (Type your answers in interval notation.)
- B. The graph is not a function.

What are the intercepts? Select the correct choice below and fill in any answer boxes within your choice.

- A. $(-2, 0)$, $(2, 0)$, $(0, 1)$
 (Type an ordered pair. Use a comma to separate answers as needed.)
- B. There are no intercepts.
- C. The graph is not a function.

Determine if the graph is symmetrical.

- A. It is symmetrical with respect to the y-axis.
- B. It is symmetrical with respect to the x-axis.
- C. It is symmetrical with respect to the origin.
- D. The graph is not symmetrical.
- E. The graph is not a function.

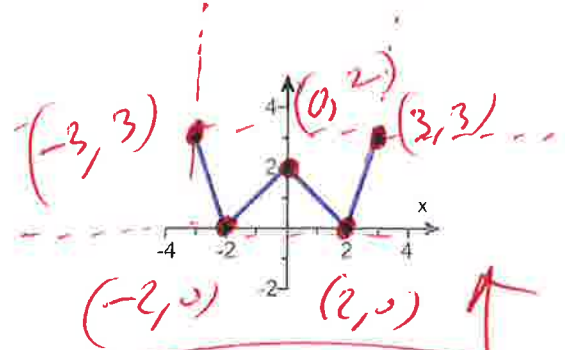
Answers Yes

- A. The domain is $(-\infty, \infty)$. The range is $(-\infty, 1]$.
 (Type your answers in interval notation.)
- A. $(2, 0), (-2, 0), (0, 1)$ (Type an ordered pair. Use a comma to separate answers as needed.)
- A. It is symmetrical with respect to the y-axis.

ID: 1.2.21

10. Using the given graph of the function f, find the following.

- (a) the intercepts, if any
- (b) its domain and range
- (c) the intervals on which it is increasing, decreasing, or constant
- (d) whether it is even, odd, or neither



(a) What are the intercepts?

x-intercept
 $(-2, 0)$ $(2, 0)$ *y-intercept*
 $(0, 2)$

(Simplify your answer. Type an ordered pair. Use a comma to separate answers as needed.)

(b) The domain is

$[-3, 3]$ *[left, right]*

(Type your answer in interval notation.)

The range is

$[0, 3]$ *[bottom, top]*

(Type your answer in interval notation.)

(c) On which interval(s) is the graph increasing? Select the correct choice below and fill in any answer boxes within your choice.

- A. The graph is increasing on $[-2, 0]$, $[2, 3]$
(Type your answer in interval notation. Use a comma to separate answers as needed.)
- B. The graph is not increasing on any interval.

On which interval(s) is the graph decreasing? Select the correct choice below and fill in any answer boxes within your choice.

- A. The graph is decreasing on $[-3, -2]$, $[0, 2]$
(Type your answer in interval notation. Use a comma to separate answers as needed.)
- B. The graph is not decreasing on any interval.

On which interval(s) is the graph constant? Select the correct choice below and fill in any answer boxes within your choice.

- A. The graph is constant on _____
(Type your answer in interval notation. Use a comma to separate answers as needed.)
- B. The graph is not constant on any interval.

(d) The function is (1) _____

- (1) even.
- odd.
- neither odd nor even.

Favorite Hamburger Place

Example
 EAT a double meat, double cheese
 double bacon
 hamburger every
 day with a diet *fed*

*Hamburger taste
 great at
 2 3 4 am
 on Saturday
 night.
 Always.*

Answers $(-2,0),(2,0),(0,2)$

$[-3,3]$

$[0,3]$

A. The graph is increasing on $[-2,0],[2,3]$.

(Type your answer in interval notation. Use a comma to separate answers as needed.)

A. The graph is decreasing on $[-3,-2],[0,2]$.

(Type your answer in interval notation. Use a comma to separate answers as needed.)

B. The graph is not constant on any interval.

(1) even.

ID: 1.3.25

11. The function f is defined as follows.

$$f(x) = \begin{cases} 4 + x & \text{if } x < 0 \\ x^2 & \text{if } x \geq 0 \end{cases}$$

- (a) Find the domain of the function.
- (b) Locate any intercepts.
- (c) Graph the function.
- (d) Based on the graph, find the range.

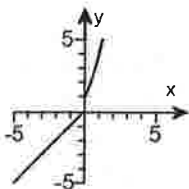
(a) The domain of the function f is $(-\infty, \infty)$ ← (left, right)
 (Type your answer in interval notation.)

(b) Locate any intercepts. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

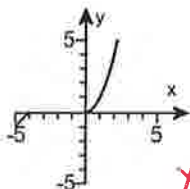
- A. The intercept(s) is/are $(-4, 0), (0, 0)$
 (Type an ordered pair. Use a comma to separate answers as needed.)
- B. There are no intercepts.

(c) Choose the correct graph of $f(x)$ below.

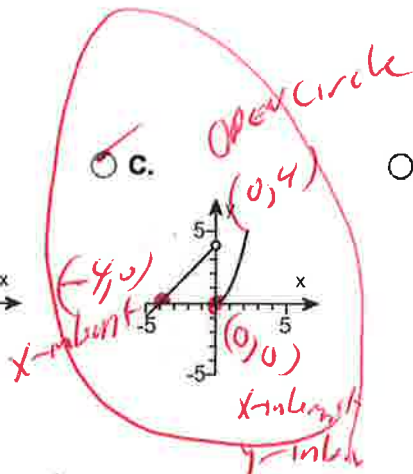
A.



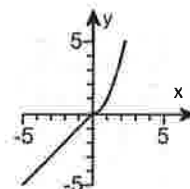
B.



C.



D.

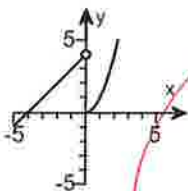


(d) The range of the function f is _____
 (Type your answer in interval notation.)

Answers $(-\infty, \infty)$

- A. The intercept(s) is/are $(-4, 0), (0, 0)$
 (Type an ordered pair. Use a comma to separate answers as needed.)

C.
 $(-\infty, \infty)$



Windows
 $x\text{-min} = -12$
 $x\text{-max} = 12$
 $y\text{-min} = -10$
 $y\text{-max} = 10$

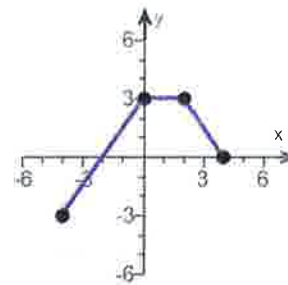
use
 graphing
 calculator

2nd Math

ID: 1.4.37

$y_1 = 4 + x$ ($x < 0$) OPEN Circle
 $y_2 = x^2$ ($x \geq 0$) Close Circle

12. The graph of a function f is illustrated to the right. Use the graph of f as the first step toward graphing each of the following functions.



(a) $F(x) = f(x) + 2$

(b) $G(x) = f(x + 5)$

(c) $P(x) = -f(x)$

(d) $H(x) = f(x + 1) - 1$

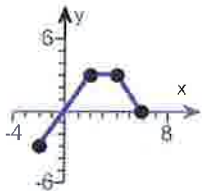
(e) $Q(x) = \frac{1}{3}f(x)$

(f) $g(x) = f(-x)$

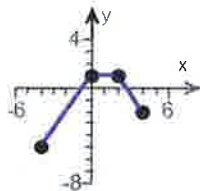
(g) $h(x) = f(2x)$

(a) Choose the correct graph of $F(x) = f(x) + 2$ below.

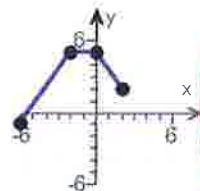
A.



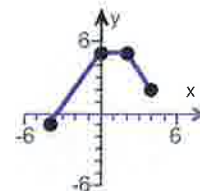
B.



C.

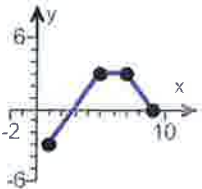


D.

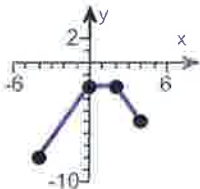


(b) Choose the correct graph of $G(x) = f(x + 5)$ below.

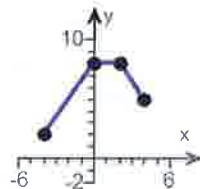
A.



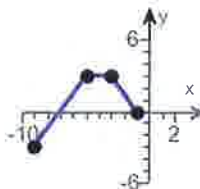
B.



C.

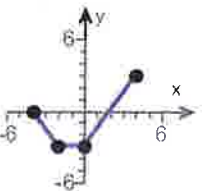


D.

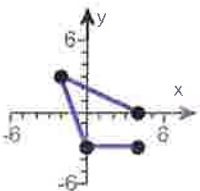


(c) Choose the correct graph of $P(x) = -f(x)$ below.

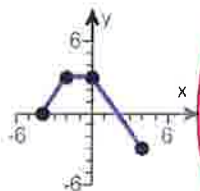
A.



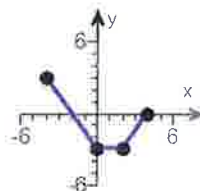
B.



C.

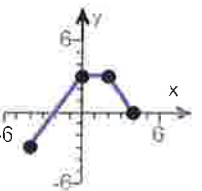


D.

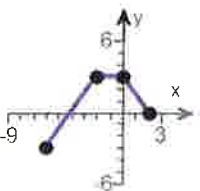


(d) Choose the correct graph of $H(x) = f(x + 1) - 1$ below.

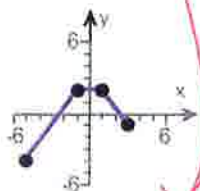
A.



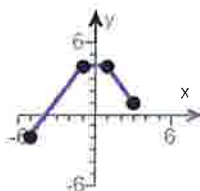
B.



C.

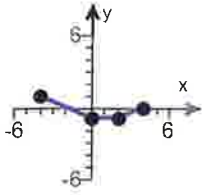


D.

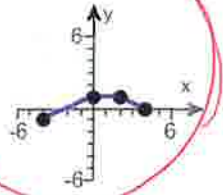


(e) Choose the correct graph of $Q(x) = \frac{1}{3}f(x)$ below.

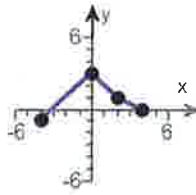
A.



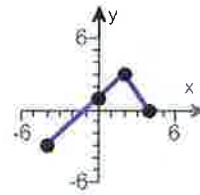
B.



C.

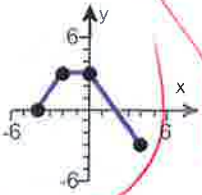


D.

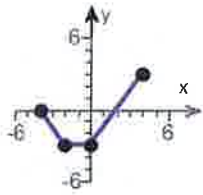


(f) Choose the correct graph of $g(x) = f(-x)$ below.

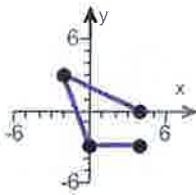
A.



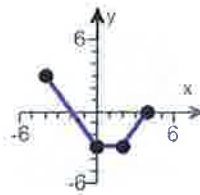
B.



C.

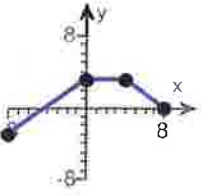


D.

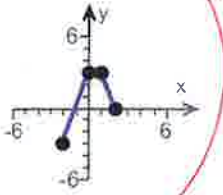


(g) Choose the correct graph of $h(x) = f(2x)$ below.

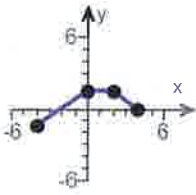
A.



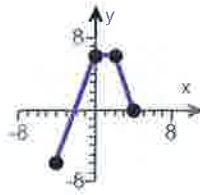
B.



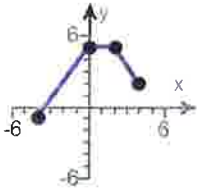
C.



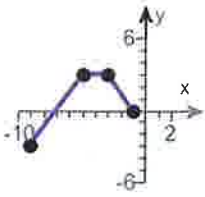
D.



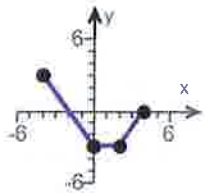
Answers



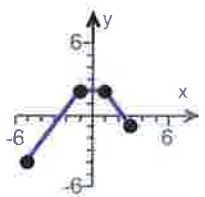
D.



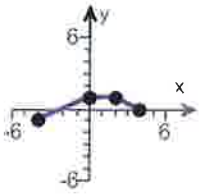
D.



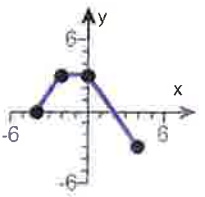
D.



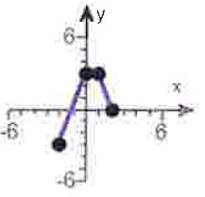
C.



B.



A.



B.

ID: 1.5.63

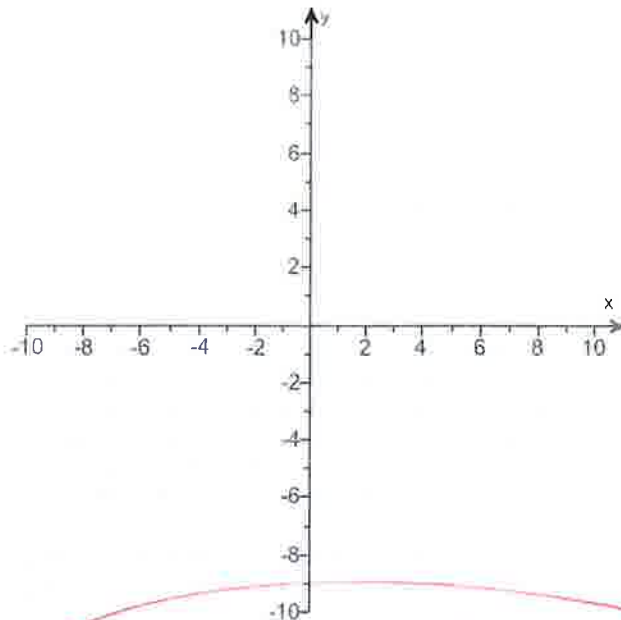
13.

- (a) Graph $f(x) = |x - 6| - 4$ using transformations.
- (b) Find the area of the region bounded by f and the x -axis that lies below the x -axis.

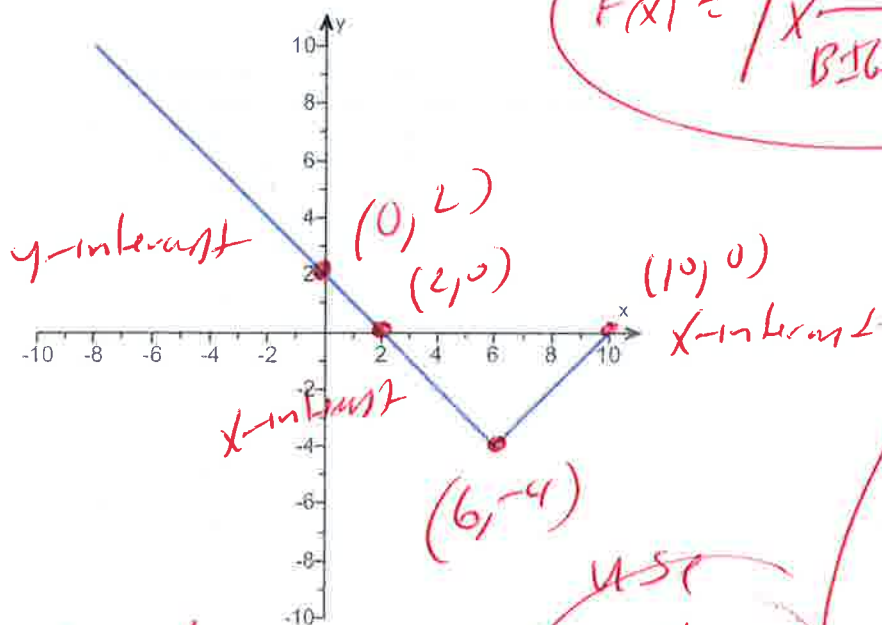
(a) Graph $f(x)$.

(Use the graphing tool provided to graph the function.)

- (b) The area of the region bounded by f and the x -axis that lies below the x -axis is _____ square units.
- (Simplify your answer.)



Answers



$$f(x) = |x - 6| - 4$$

BIC BIC

x	f(x)
0	2
2	0
6	-4
10	0

use
graphing
calculator

16

ID: 1.5.81

Windows

x-min = -12
x-max = 12
y-min = -10
y-max = 10

$y_1 = \text{math, Num, abs}$

$$y_1 = \text{abs}(x - 6) - 4$$

14. Find the zeros, if any, of the quadratic function using the quadratic formula. What are the x-intercepts, if any, of the graph of the function?

$$f(x) = 8x^2 + 11 + 20x$$

$$f(x) = 8x^2 + 20x + 11 \quad \text{rewrite}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice. (Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)

- A. The zeros and the x-intercepts are the same. They are _____.
- B. The zeros and the x-intercepts are different. The zeros are _____, the x-intercepts are _____.
- C. There is no real zero solution and no x-intercept.

Answer: A. The zeros and the x-intercepts are the same. They are $\frac{-5+\sqrt{3}}{4}, \frac{-5-\sqrt{3}}{4}$.

ID: 2.3.47

$$f(x) = 8x^2 + 20x + 11$$

$a=8, b=20, c=11$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(20) \pm \sqrt{(20)^2 - 4(8)(11)}}{2(8)}$$

$$x = \frac{-20 \pm \sqrt{400 - 352}}{16}$$

$$x = \frac{-20 \pm \sqrt{48}}{16}$$

$$x = \frac{-20 \pm \sqrt{16 \cdot 3}}{16}$$

$$x = \frac{-20 \pm \sqrt{16} \sqrt{3}}{16}$$

$$x = \frac{-20 \pm 4\sqrt{3}}{16}$$

for math \rightarrow

$$x = \frac{4(-5 \pm 1\sqrt{3})}{4(4)}$$

$$x = \frac{-5 \pm 1\sqrt{3}}{4}$$

$$x = \frac{-5 \pm \sqrt{3}}{4}$$

$$x = \frac{-5 + \sqrt{3}}{4}$$

$$x = \frac{-5 - \sqrt{3}}{4}$$

15
~~15~~
next page
please

15

For the quadratic function $f(x) = x^2 + 6x$, answer parts (a) through (c).

(a) Graph the quadratic function by determining whether its graph opens up or down and by finding its vertex, axis of symmetry, y-intercept, and x-intercepts, if any.

Does the graph of f open up or down?

- down
 up

What are the coordinates of the vertex?

The vertex of the parabola is _____.
 (Type an ordered pair. Use integers or fractions for any numbers in the expression.)

What is the equation of the axis of symmetry?

The axis of symmetry is _____.
 (Type an equation.)

What is/are the x-intercept(s)? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The x-intercept(s) is/are _____.
 (Type an integer or a decimal. Use a comma to separate answers as needed.)
- B. There are no x-intercepts.

What is the y-intercept? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The y-intercept is _____.
 (Type an integer or a decimal.)
- B. There is no y-intercept.

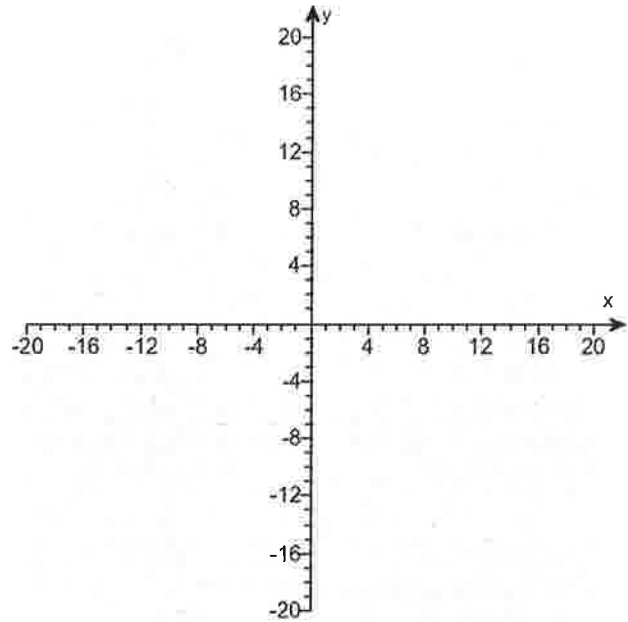
Use the graphing tool to graph the function.

(b) Determine the domain and the range of the function.

The domain of f is _____.
 (Type your answer in interval notation.)

The range of f is _____.
 (Type your answer in interval notation.)

(c) Determine where the function is increasing and where it is decreasing.



Answers up

(-3, -9)

x = -3

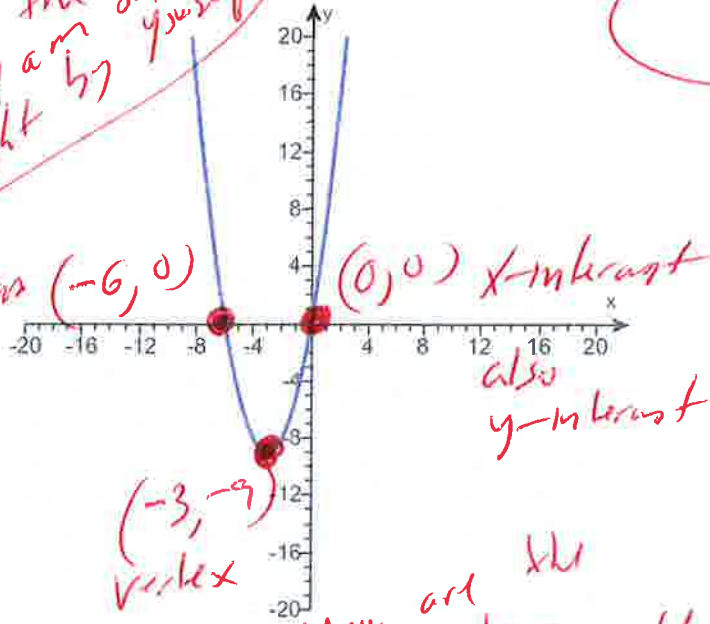
A. The x-intercept(s) is/are 0, -6.

(Type an integer or a decimal. Use a comma to separate answers as needed.)

A. The y-intercept is 0. (Type an integer or a decimal.)

$f(x) = x^2 + 6x$

Example in the on swimming at 2:34 am on Saturday night by yourself



x	f(x)
-6	0
-3	-9
0	0

- (-∞, ∞)
- [-9, ∞)
- [-3, ∞)
- (-∞, -3]

Min You are the vertex use windows graphing calculator

windows
x-min = -12
x-max = 12
y-min = -10
y-max = 10

Sharks sleep at night always

$y_1 = x^2 + 6x$

ID: 2.4.33

~~16~~
next page please

16.

For the quadratic function $f(x) = x^2 - 4x - 5$, answer parts (a) through (c).

(a) Graph the quadratic function by determining whether its graph opens up or down and by finding its vertex, axis of symmetry, y-intercept, and x-intercepts, if any.

Does the graph of f open up or down?

- down
 up

What are the coordinates of the vertex?

The vertex of the parabola is _____.
 (Type an ordered pair. Use integers or fractions for any numbers in the expression.)

What is the equation of the axis of symmetry?

The axis of symmetry is _____.
 (Type an equation.)

What is/are the x-intercept(s)? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The x-intercept(s) is/are _____.
 (Type an integer or a decimal. Use a comma to separate answers as needed.)

- B. There are no x-intercepts.

What is the y-intercept? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The y-intercept is _____.
 (Type an integer or a decimal.)
- B. There is no y-intercept.

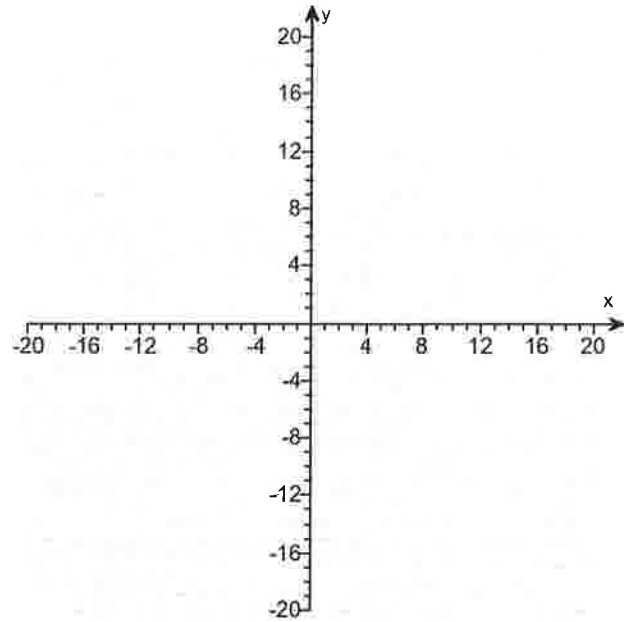
Use the graphing tool to graph the function.

(b) Determine the domain and the range of the function.

The domain of f is _____.
 (Type your answer in interval notation.)

The range of f is _____.
 (Type your answer in interval notation.)

(c) Determine where the function is increasing and where it is decreasing.



Answers up

(2, -9)

x = 2

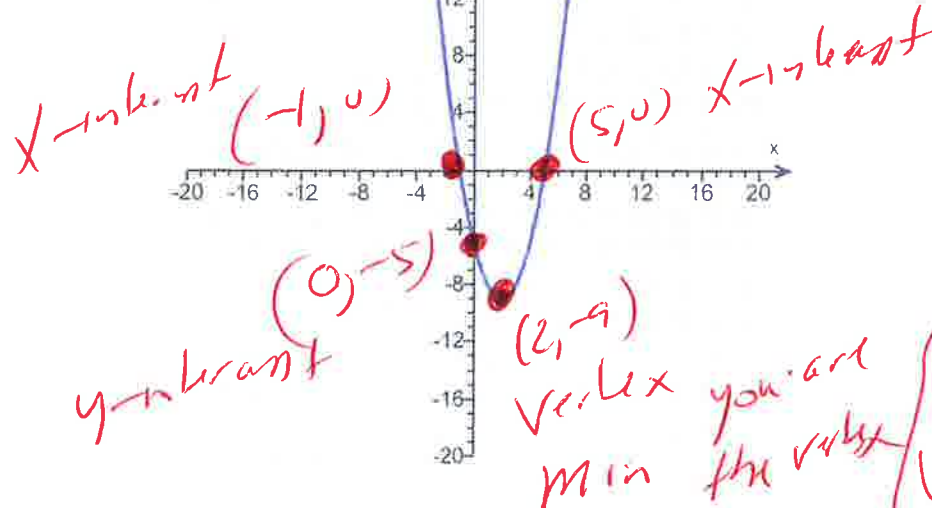
A. The x-intercept(s) is/are 5, -1

(Type an integer or a decimal. Use a comma to separate answers as needed.)

A. The y-intercept is -5. (Type an integer or a decimal.)

example
Like swimming in the ocean at 233 am on Saturday night by yourself.

$f(x) = x^2 - 4x - 5$



x	f(x)
-1	0
0	-5
2	-9
5	0

- (-∞, ∞)
- [-9, ∞)
- [2, ∞)
- (-∞, 2]

Windows

$x - \min = -12$
 $x - \max = 12$
 $y - \min = -10$
 $y - \max = 10$

USE Graphing calculator

Sharks never eat at night.

$y_1 = x^2 - 4x - 5$
BIT BIT

ID: 2.4.37

17
next page
please
thanks

17

For the quadratic function $f(x) = x^2 + 4x + 4$, answer parts (a) through (c).

(a) Graph the quadratic function by determining whether its graph opens up or down and by finding its vertex, axis of symmetry, y-intercept, and x-intercepts, if any.

Does the graph of f open up or down?

- down
 up

What are the coordinates of the vertex?

The vertex of the parabola is _____.
 (Type an ordered pair. Use integers or fractions for any numbers in the expression.)

What is the equation of the axis of symmetry?

The axis of symmetry is _____.
 (Type an equation.)

What is the y-intercept? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The y-intercept is _____.
 (Type an integer or a decimal.)
 B. There is no y-intercept.

What is/are the x-intercept(s)? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The x-intercept(s) is/are _____.
 (Type an integer or a decimal. Use a comma to separate answers as needed.)
 B. There are no x-intercepts.

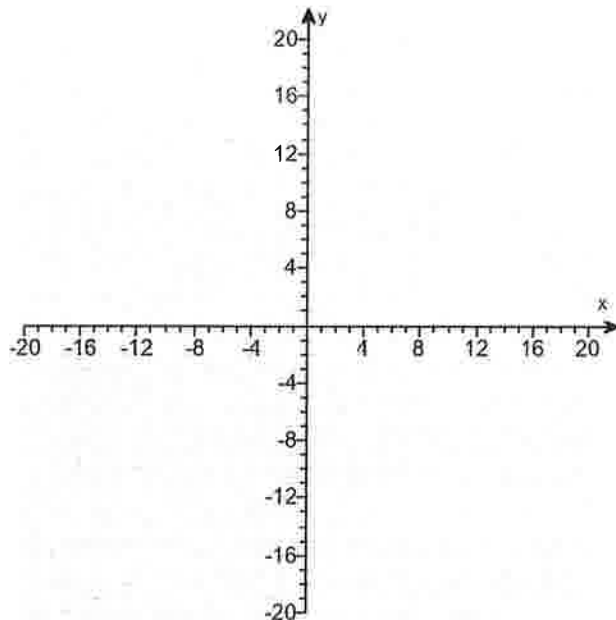
Use the graphing tool to graph the function.

(b) Determine the domain and the range of the function.

The domain of f is _____.
 (Type your answer in interval notation.)

The range of f is _____.
 (Type your answer in interval notation.)

(c) Determine where the function is increasing and where it is decreasing.



Answers up

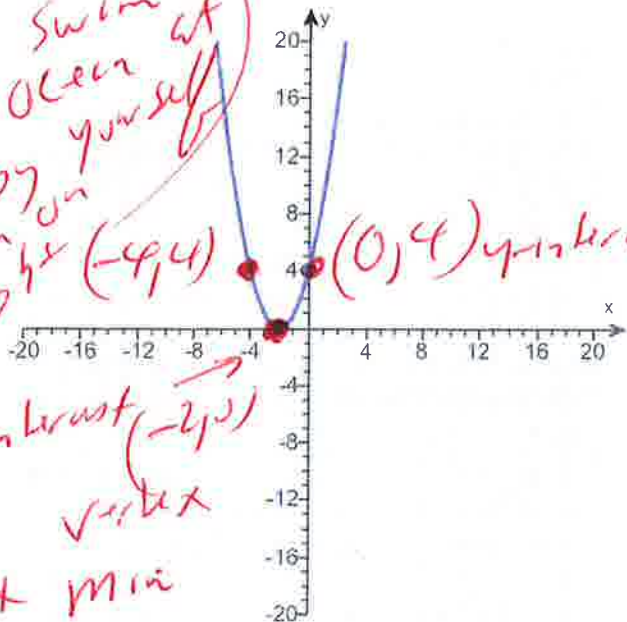
$(-2, 0)$

$x = -2$

A. The y-intercept is 4. (Type an integer or a decimal.)

A. The x-intercept(s) is/are -2.

(Type an integer or a decimal. Use a comma to separate answers as needed.)



$f(x) = x^2 + 4x + 4$

x	f(x)
-4	4
-2	0
0	4

vertex

- $(-\infty, \infty)$
- $[0, \infty)$
- $[-2, \infty)$
- $(-\infty, -2]$

Windows
 $x - \min = -12$
 $x - \max = 12$
 $y - \min = -10$
 $y - \max = 10$

use graphing calculator

ID: 2.4.39

Do not wake up the sleeping sharks at night.

$y_1 = x^2 + 4x + 4$

~~18~~

Next Page
Please

18

For the quadratic function $f(x) = -2x^2 + 2x - 1$, answer parts (a) through (c). Verify the results using a graphing utility.

(a) Graph the quadratic function by determining whether its graph opens up or down and by finding its vertex, axis of symmetry, y-intercept, and x-intercepts, if any.

The graph of f opens (1) _____

The vertex of f is _____.
(Type an ordered pair.)

The axis of symmetry is _____.
(Type an equation. Simplify your answer.)

Determine the y-intercept. Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The y-intercept is _____.
(Type an integer or a decimal.)
- B. There is no y-intercept.

Determine the x-intercept(s). Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The x-intercept(s) is/are _____.
(Type an integer or a decimal rounded to two decimal places as needed. Use a comma to separate answers as needed.)
- B. There is no x-intercept.

Use the graphing tool to graph the function.

(b) Determine the domain and the range of the function.

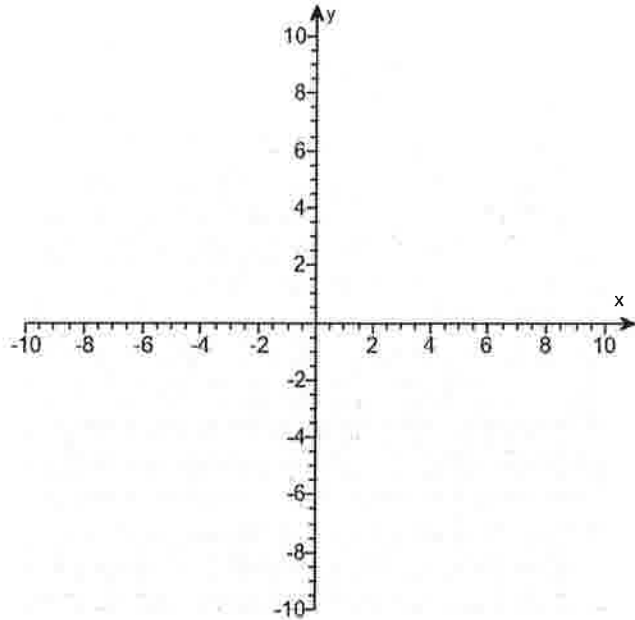
The domain of f is _____.
(Type your answer in interval notation.)

The range of f is _____.
(Type your answer in interval notation.)

(c) Determine where the function is increasing and where it is decreasing.

The function is increasing on the interval _____.
(Type your answer in interval notation.)

The function is decreasing on the interval _____.



- (1) up.
- down.

Answers (1) down.

$$\left(\frac{1}{2}, -\frac{1}{2}\right)$$

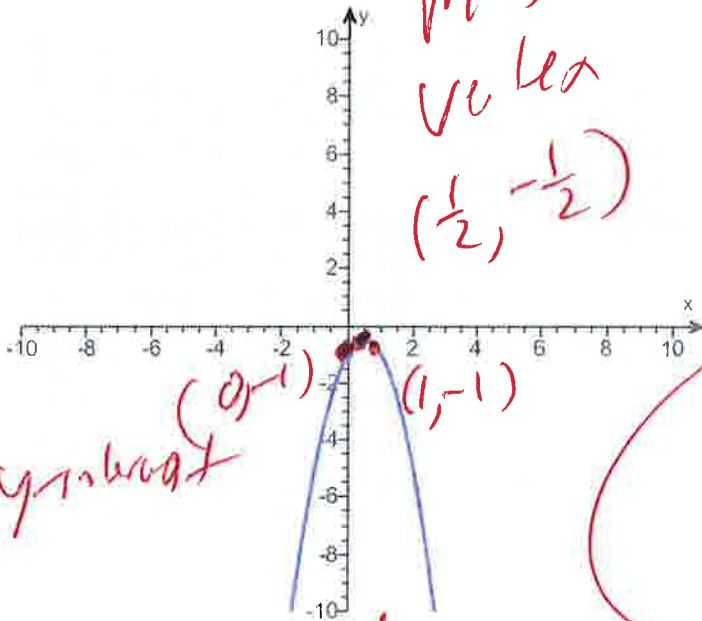
$$x = \frac{1}{2}$$

A. The y-intercept is -1. (Type an integer or a decimal.)

B. There is no x-intercept.

$$f(x) = -2x^2 + 2x - 1$$

x	f(x)
0	-1
$\frac{1}{2}$	$-\frac{1}{2}$
1	-1



Max
value
 $(\frac{1}{2}, -\frac{1}{2})$

value

Use
Graphing
Calculator

- $(-\infty, \infty)$
- $[-\infty, -\frac{1}{2}]$
- $[-\infty, \frac{1}{2}]$
- $[\frac{1}{2}, \infty)$

Window
 $x\text{-min} = -12$
 $x\text{-max} = 12$
 $y\text{-min} = -10$
 $y\text{-max} = 10$

Swim in the sea at
 2:30 am on Saturday
 night only till you
 get leg and arm
 cramps.

Lucky
you

ID: 2.4.43

Sharks
eat at
night.

$$y_1 = -2x^2 + 2x - 1$$

Little BIG

19. Find the vertical, horizontal, and oblique asymptotes, if any, for the following rational function.

$R(x) = \frac{2x}{x+18}$

$R(x) = \frac{2x}{x+18}$

Set bottom = 0
 $x+18=0$
 $x+18-18=0-18$
 $x=-18$

Select the correct choice below and fill in any answer boxes within your choice.

- A. The vertical asymptote(s) is/are $x =$ _____
(Use a comma to separate answers as needed.)
- B. There is no vertical asymptote.

Vertical asymptote

$x = -18$

Select the correct choice below and fill in any answer boxes within your choice.

- A. The horizontal asymptote(s) is/are $y =$ _____
(Use a comma to separate answers as needed.)
- B. There is no horizontal asymptote.

$R(x) = \frac{2x}{x+18}$
Highest power top
Highest power bottom
 $= \frac{2x}{1}$

Horizontal asymptote

Select the correct choice below and fill in any answer boxes within your choice.

- A. The oblique asymptote(s) is/are $y =$ _____
(Use a comma to separate answers as needed.)
- B. There is no oblique asymptote.

$= \frac{2x}{1}$
 $= 2$

Answers A. The vertical asymptote(s) is/are $x =$ -18
(Use a comma to separate answers as needed.)

A. The horizontal asymptote(s) is/are $y =$ 2
(Use a comma to separate answers as needed.)

$y = 2$

B. There is no oblique asymptote.

Horizontal asymptote

ID: 3.4.45

Since highest power on top is same as highest power on the bottom then there is no oblique asymptote

20. For $f(x) = 9x + 8$ and $g(x) = 9x$, find the following composite functions and state the domain of each.

(a) $f \circ g$ (b) $g \circ f$ (c) $f \circ f$ (d) $g \circ g$

(a) $(f \circ g)(x) = \underline{\hspace{2cm}}$ (Simplify your answer.)

Select the correct choice below and fill in any answer boxes within your choice.

- A. The domain of $f \circ g$ is $\{x \mid \underline{\hspace{2cm}}\}$.
(Type an inequality. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- B. The domain of $f \circ g$ is all real numbers.

(b) $(g \circ f)(x) = \underline{\hspace{2cm}}$ (Simplify your answer.)

Select the correct choice below and fill in any answer boxes within your choice.

- A. The domain of $g \circ f$ is $\{x \mid \underline{\hspace{2cm}}\}$.
(Type an inequality. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- B. The domain of $g \circ f$ is all real numbers.

(c) $(f \circ f)(x) = \underline{\hspace{2cm}}$ (Simplify your answer.)

Select the correct choice below and fill in any answer boxes within your choice.

- A. The domain of $f \circ f$ is $\{x \mid \underline{\hspace{2cm}}\}$.
(Type an inequality. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- B. The domain of $f \circ f$ is all real numbers.

(d) $(g \circ g)(x) = \underline{\hspace{2cm}}$ (Simplify your answer.)

Select the correct choice below and fill in any answer boxes within your choice.

- A. The domain of $g \circ g$ is $\{x \mid \underline{\hspace{2cm}}\}$.
(Type an inequality. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
- B. The domain of $g \circ g$ is all real numbers.

Answers $81x + 8$ B. The domain of $f \circ g$ is all real numbers.

$81x + 72$

B. The domain of $g \circ f$ is all real numbers.

$81x + 80$

B. The domain of $f \circ f$ is all real numbers.

$81x$

B. The domain of $g \circ g$ is all real numbers.

ID: 4.1.23

$(20) 9$

$f(x) = 9x + 8$

$g(x) = 9x$

Insert here

$(f \circ g)(x) =$

$f(g(x)) =$

$f(9x) =$

$9(9x) + 8 =$

$81x + 8 =$

Domain $(-\infty, \infty)$

Insert here

$(20) 6$

$f(x) = 9x + 8$

$g(x) = 9x$

$(g \circ f)(x) =$

$g(f(x)) =$

$g(9x + 8) =$

$9(9x + 8) =$

$81x + 72$

Domain

 $(-\infty, \infty)$

21. Next page

(20) c

$f(x) = 9x + 8$ and $g(x) = 9x$

Issue itself

$$(f \circ g)(x) =$$

$$f(g(x)) =$$

$$9(9x + 8) + 8 =$$

$$81x + 72 + 8 =$$

$$81x + 80$$

Domain
 $(-\infty, \infty)$

(20) d $f(x) = 9x + 8$ and $g(x) = 9x$

Issue itself

$$(g \circ g)(x) =$$

$$g(g(x)) =$$

$$9(9x) =$$

$$81x$$

Domain
 $(-\infty, \infty)$

21.

The function $f(x) = 6x + 2$ is one-to-one.

- (a) Find the inverse of f and check the answer.
- (b) Find the domain and the range of f and f^{-1} .
- (c) Graph f , f^{-1} , and $y = x$ on the same coordinate axes.

(a) $f^{-1}(x) =$ _____

(Simplify your answer. Use integers or fractions for any numbers in the expression.)

(b) Find the domain of f . Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The domain is $\{x|x \geq \text{_____}\}$.
- B. The domain is $\{x|x \neq \text{_____}\}$.
- C. The domain is $\{x|x \leq \text{_____}\}$.
- D. The domain is the set of all real numbers.

Find the range of f . Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

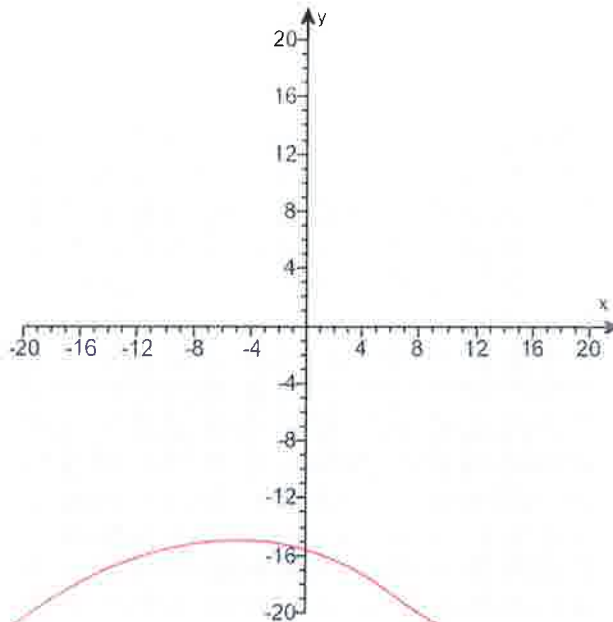
- A. The range is $\{y|y \neq \text{_____}\}$.
- B. The range is $\{y|y \geq \text{_____}\}$.
- C. The range is $\{y|y \leq \text{_____}\}$.
- D. The range is the set of all real numbers.

Find the domain of f^{-1} . Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The domain is $\{x|x \geq \text{_____}\}$.
- B. The domain is $\{x|x \neq \text{_____}\}$.
- C. The domain is $\{x|x \leq \text{_____}\}$.
- D. The domain is the set of all real numbers.

Find the range of f^{-1} . Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The range is $\{y|y \neq \text{_____}\}$.
- B. The range is $\{y|y \geq \text{_____}\}$.
- C. The range is $\{y|y \leq \text{_____}\}$.
- D. The range is the set of all real numbers.



Handwritten work in red ink:

$f(x) = 6x + 2$

Set $y =$

$y = 6x + 2$

$x = 6y + 2$ (inv. write $x-y$)

$x - 2 = 6y + 2 - 2$ (Solve for y)

$x - 2 = 6y$

$\frac{x-2}{6} = \frac{6y}{6}$

$\frac{x-2}{6} = y$

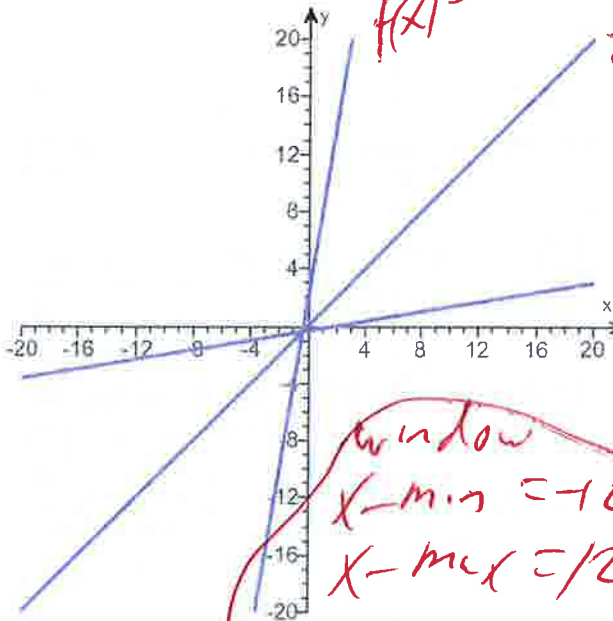
$y = \frac{x-2}{6}$ (Rewrite)

$f^{-1}(x) = \frac{x-2}{6}$

INVERSE

Answers $\frac{x-2}{6}$

- D. The domain is the set of all real numbers.
- D. The range is the set of all real numbers.
- D. The domain is the set of all real numbers.
- D. The range is the set of all real numbers.



$y_1 = 6x + 2$
 $y_2 = x$

$f^{-1}(x) = (x-2) \div 6$

$y_3 = (x-2) \div 6$

Window
 $x_{min} = -12$
 $x_{max} = 12$
 $y_{min} = -10$
 $y_{max} = 10$

Use a graphing calculator

ID: 4.2.53

22. Solve the equation.

$16^{-x+44} = 128^x$

The solution set is { }.

(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

Answer: 16

$(2)^{-x+44} = (2^7)^x$

$-4x + 176 = 7x$

$-4x + 176 = 7x$

$-4x + 176 - 176 = 7x - 176$

$-4x = 7x - 176$

$-4x - 7x = 7x - 176 - 7x$

$-11x = -176$

$-11x = -176$

$x = 16$

$x = 16$

Prime 2, 3, 5, 7, 11, 13
 $2 \sqrt{16}$
 $2 \sqrt{128}$
 $2 \sqrt{64}$
 $2 \sqrt{32}$
 $2 \sqrt{16}$
 $2 \sqrt{8}$
 $2 \sqrt{4}$
 $2 \sqrt{2}$
 1

$16 = 2 \cdot 2 \cdot 2 \cdot 2$

$16 = 2^4$

$128 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$

$128 = 2^7$

23. Solve the equation.

log₂(2x + 1) = 3

Change the given logarithmic equation to exponential form.

(Type an equation. Do not simplify.)

The solution set is { }.

(Simplify your answer. Use a comma to separate answers as needed.)

Answers 2x + 1 = 2³

7/2

ID: 4.4.91-Setup & Solve

*work on
work off
for rule*

log₂(2x+1) = 3

2³ = 2x+1

2 · 2 · 2 = 2x+1

8 = 2x+1

8 - 1 = 2x+1-1

7 = 2x

7/2 = 2x/2

7/2 = x

24. Write the expression as a sum and/or difference of logarithms. Express powers as factors.

log [x(x+6) / (x+3)⁸], x > 0

log [x(x+6) / (x+3)⁸] = _____ (Simplify your answer.)

Answer: log x + log (x + 6) - 8 log (x + 3)

ID: 4.5.51

for rule

log(A/B) = log(A) - log(B)

log(AB) = log(A) + log(B)

log(A^N) = N log(B)

log (x(x+6) / (x+3)⁸) =

log(x(x+6)) - log(x+3)⁸ =

log(x) + log(x+6) - log(x+3)⁸ =

log(x) + log(x+6) - 8 log(x+3) =

25. Solve the logarithmic equation.

log x + log (x - 48) = 2

Determine the equation to be solved after removing the logarithm.

(Type an equation. Do not simplify.)

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The solution set is { } (Simplify your answer. Type an exact answer. Use a comma to separate answers as needed.)

B. There is no solution.

Answers x(x - 48) = 10^2

A. The solution set is { 50 } (Simplify your answer. Type an exact answer. Use a comma to separate answers as needed.)

ID: 4.6.17-Setup & Solve

26. Find the amount that results from the given investment.

\$300 invested at 12% compounded quarterly after a period of 4 years

After 4 years, the investment results in \$ (Round to the nearest cent as needed.)

Answer: 481.41

ID: 4.7.7

27. How many years will it take for an initial investment of \$20,000 to grow to \$70,000? Assume a rate of interest of 20% compounded continuously.

It will take about years for the investment to grow to \$70,000 (Round to two decimal places as needed.)

Answer: 6.26

ID: 4.7.41

Handwritten work for problem 27: 3.5 = e^{0.20t}, ln(3.5) = ln(e^{0.20t}), ln(3.5) = 0.20t ln(e), ln(3.5) = 0.20t(1)

Handwritten work for problem 27: A = Pe^{rt}, ln(3.5) = 0.20t, ln(3.5) = 0.20t / 0.20, ln(3.5) = t, 6.263814842 = t, 6.26 = t (Round)

Handwritten work for problem 25: log(x)(x-48) = 2, log(50) + log(50-48) = 2, log(50) + log(2) = 2, Good Good, Answer X=50 only

28. Solve the system of equations. If the system has no solution, say that it is inconsistent.

$$\begin{cases} 2x - 4y = -8 \\ 5x + y = 13 \end{cases}$$

mult

$$\begin{array}{r} (1) \quad 2x - 4y = -8 \\ (4) \quad \underline{20x + 4y = 52} \\ \hline 22x + 0 = 44 \end{array}$$

$$\begin{aligned} 22x &= 44 \\ \frac{22x}{22} &= \frac{44}{22} \end{aligned}$$

$$x = 2$$

Select the correct choice below and, if necessary, fill in any answer boxes within your choice.

- A. The solution of the system is $x =$ _____ and $y =$ _____ (Type an integers or simplified fractions.)
- B. There are infinitely many solutions. Using ordered pairs, the solution can be written as $\{(x,y) \mid x =$ _____, y any real number $\}$. (Simplify your answer. Type an expression using y as the variable as needed.)
- C. The system is inconsistent.

Subst

$$\begin{aligned} 2x - 4y &= -8 \\ 2(2) - 4y &= -8 \\ 4 - 4y &= -8 \\ 4 - 4y - 4 &= -8 - 4 \\ -4y &= -12 \\ \frac{-4y}{-4} &= \frac{-12}{-4} \\ y &= 3 \end{aligned}$$

Answer: A. The solution of the system is $x =$ 2 and $y =$ 3. (Type an integers or simplified fractions.)

$$(x, y) = (2, 3)$$

ID: 6.1.33

29. Solve the given system of equations. If the system has no solution, say that it is inconsistent.

$$\begin{cases} x - 2y + 3z = 3 \\ 2x + y + z = -4 \\ -3x + 2y - 2z = 2 \end{cases}$$

2ND, Matrix, edit, 3x4, rref [A]

$$[A] = \begin{bmatrix} 1 & -2 & 3 & 3 \\ 2 & 1 & 1 & -4 \\ -3 & 2 & -2 & 2 \end{bmatrix}$$

Select the correct choice below and fill in any answer boxes within your choice.

- A. The solution is $x =$ _____, $y =$ _____, and $z =$ _____ (Type integers or simplified fractions.)
- B. There are infinitely many solutions. Using ordered triplets, they can be expressed as $\{(x,y,z) \mid x =$ _____, $y =$ _____, z any real number $\}$. (Simplify your answers. Type expressions using z as the variable as needed.)
- C. There are infinitely many solutions. Using ordered triplets, they can be expressed as $\{(x,y,z) \mid x =$ _____, y any real number, z any real number $\}$. (Simplify your answer. Type an expression using y and z as the variables as needed.)
- D. The system is inconsistent.

2ND Matrix, rref [A]

$$rref([A]) = \begin{bmatrix} 1 & 0 & 0 & -2 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & 1 \end{bmatrix}$$

Answer: A.

The solution is $x =$ -2, $y =$ -1, and $z =$ 1. (Type integers or simplified fractions.)

ID: 6.1.45

$$(x, y, z) = (-2, -1, 1)$$

Use Graphing Calculator

30. Find the sum of the sequence.

MATH → summation Σ

Σ (3k - 8) from k=1 to 5 =

(3(1)-8) + (3(2)-8) + (3(3)-8) + (3(4)-8) + (3(5)-8) =

Σ (3k - 8) =

(3-8) + (6-8) + (9-8) + (12-8) + (15-8) =

Answer: 5 (-5) + (-2) + (1) + (4) + (7) =

5

ID: 7.1.73

31. Expand the expression using the binomial theorem.

Use Graphing Calculator

(x+2)^6

(x+2)^6 =

Binomial expansion formula: C(6,0)(x)^6(2)^0 + C(6,1)(x)^5(2)^1 + C(6,2)(x)^4(2)^2 + C(6,3)(x)^3(2)^3 + C(6,4)(x)^2(2)^4 + C(6,5)(x)^1(2)^5 + C(6,6)(x)^0(2)^6

Answer: x^6 + 12x^5 + 60x^4 + 160x^3 + 240x^2 + 192x + 64

ID: 7.5.17

32. Find the real solutions of the equation.

7 + sqrt(3x-11) = x

sqrt(3x-11) = x-7

Select the correct choice below and, if necessary, fill in the answer box to complete your answer.

A. The solution set is { }.

B. The solution is the empty set.

Answer: A. The solution set is { 12 }.

(Simplify your answer. Use a comma to separate answers as needed.)

ID: A.8.55

0 = x^2 - 14x + 49 - 3sqrt(x-7)

0 = x^2 - 17x + 60

0 = (x-5)(x-12)

x-5=0 OR x-12=0

x-5+5=0+5 OR x-12+12=0+12

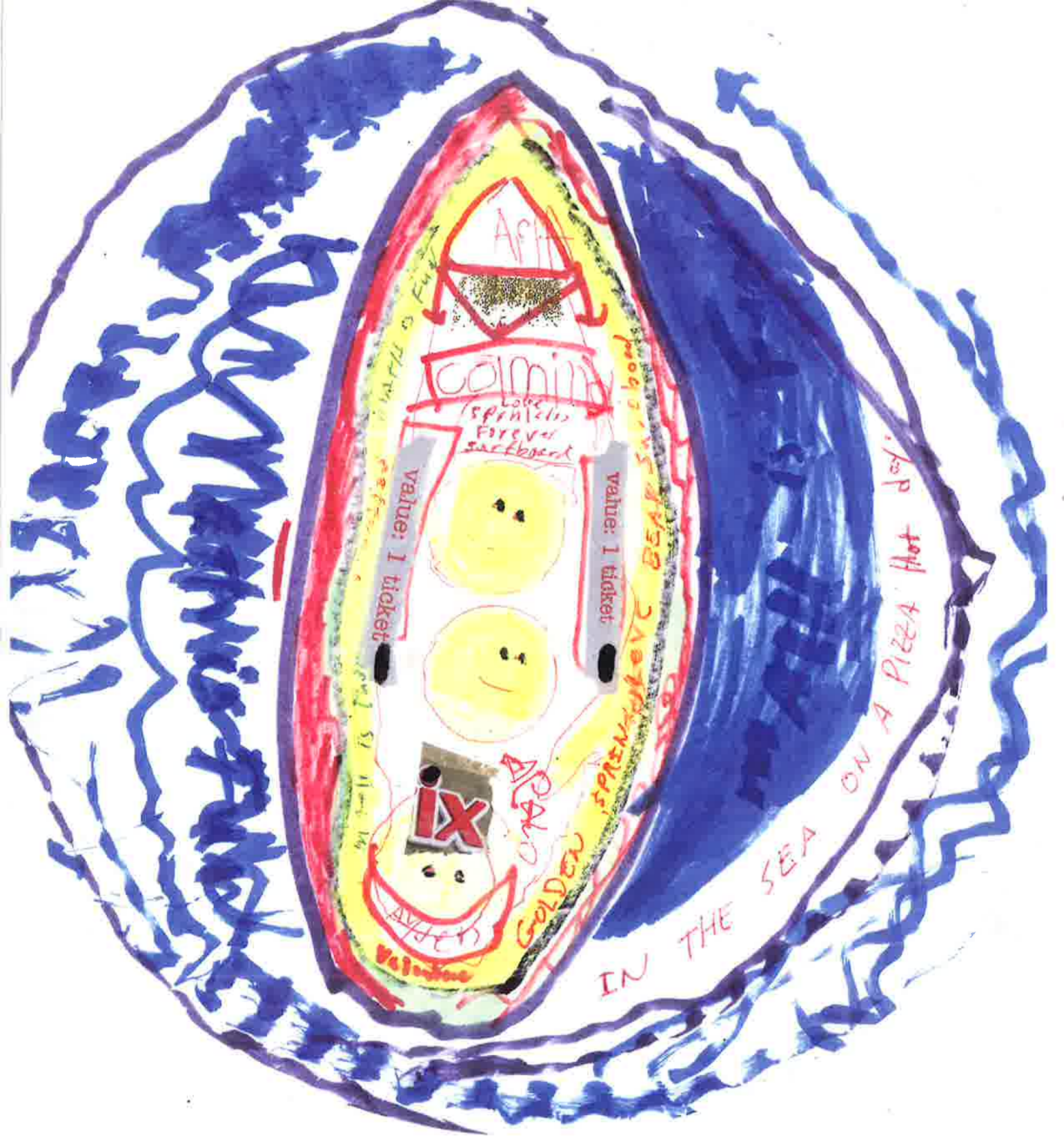
x=5 OR x=12

check

answer

x=12

Good



APR

COMING

Love
sprinkles
Forever
sweetheart

value: 1 ticket

value: 1 ticket

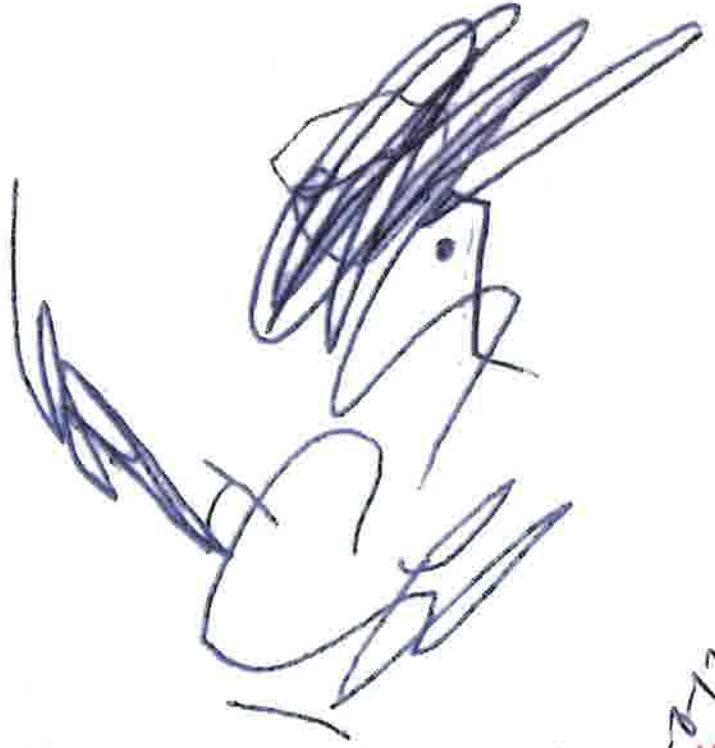


GOLDEN

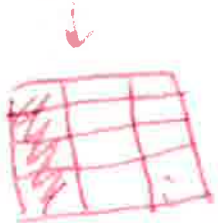
BEAR SAUCE

SPRINKLES

IN THE SEA ON A PIZZA Hot day.



$$\frac{1}{3} \times \frac{4}{4} = \frac{4}{12}, \quad \frac{2}{4} \times \frac{3}{3} = \frac{6}{12}$$



SMART Bird 5-0-17
MARI

MATH IS
FUN

$$\frac{4}{12} + \frac{6}{12} = \frac{10}{12} = \frac{5}{6}$$

$$\frac{12}{12} - \frac{10}{12} = \frac{2}{12} \text{ or } \frac{1}{6}$$

MARI MARI MARI

BROKEN SURFBOARD



121119, APRIL



MATH is FUN

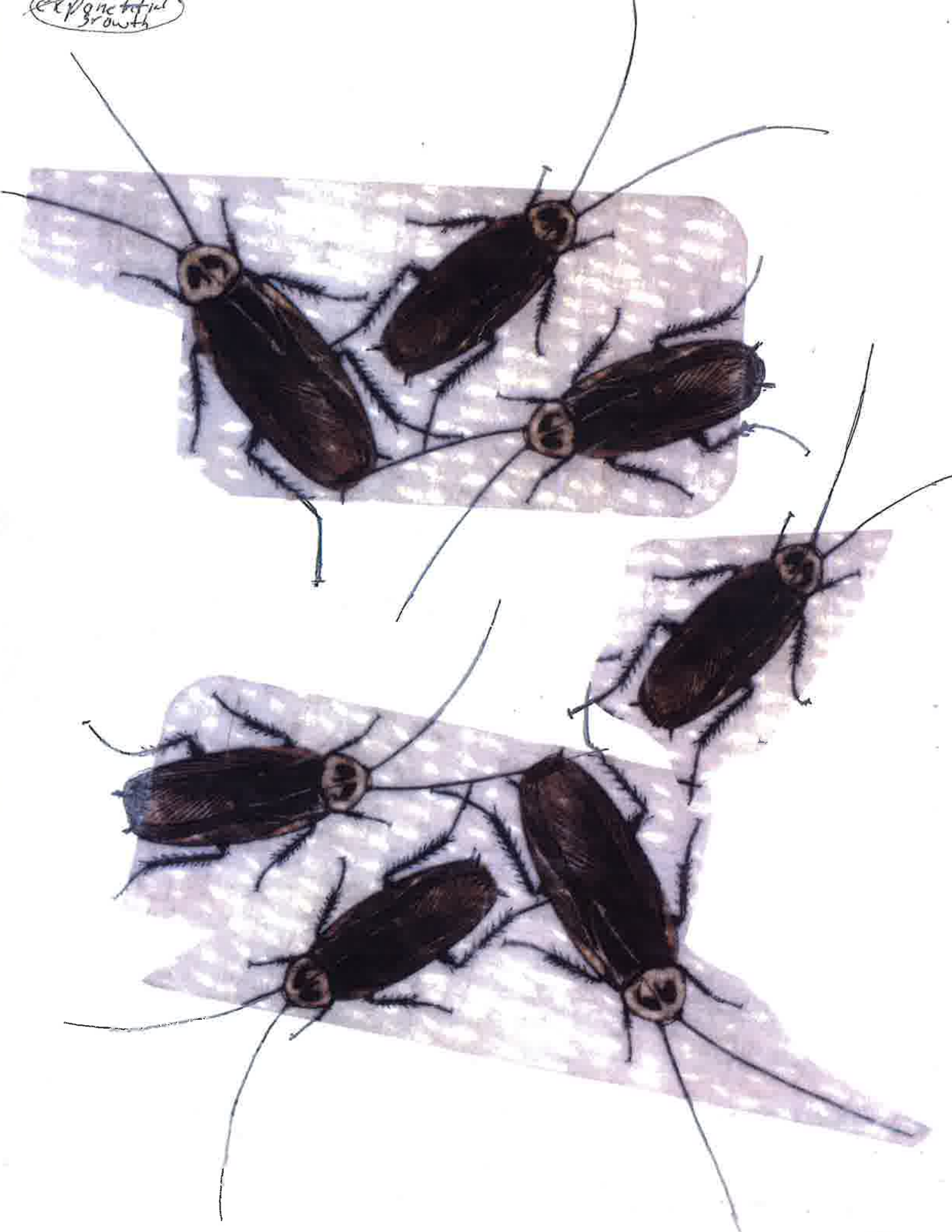


MATH

MATH

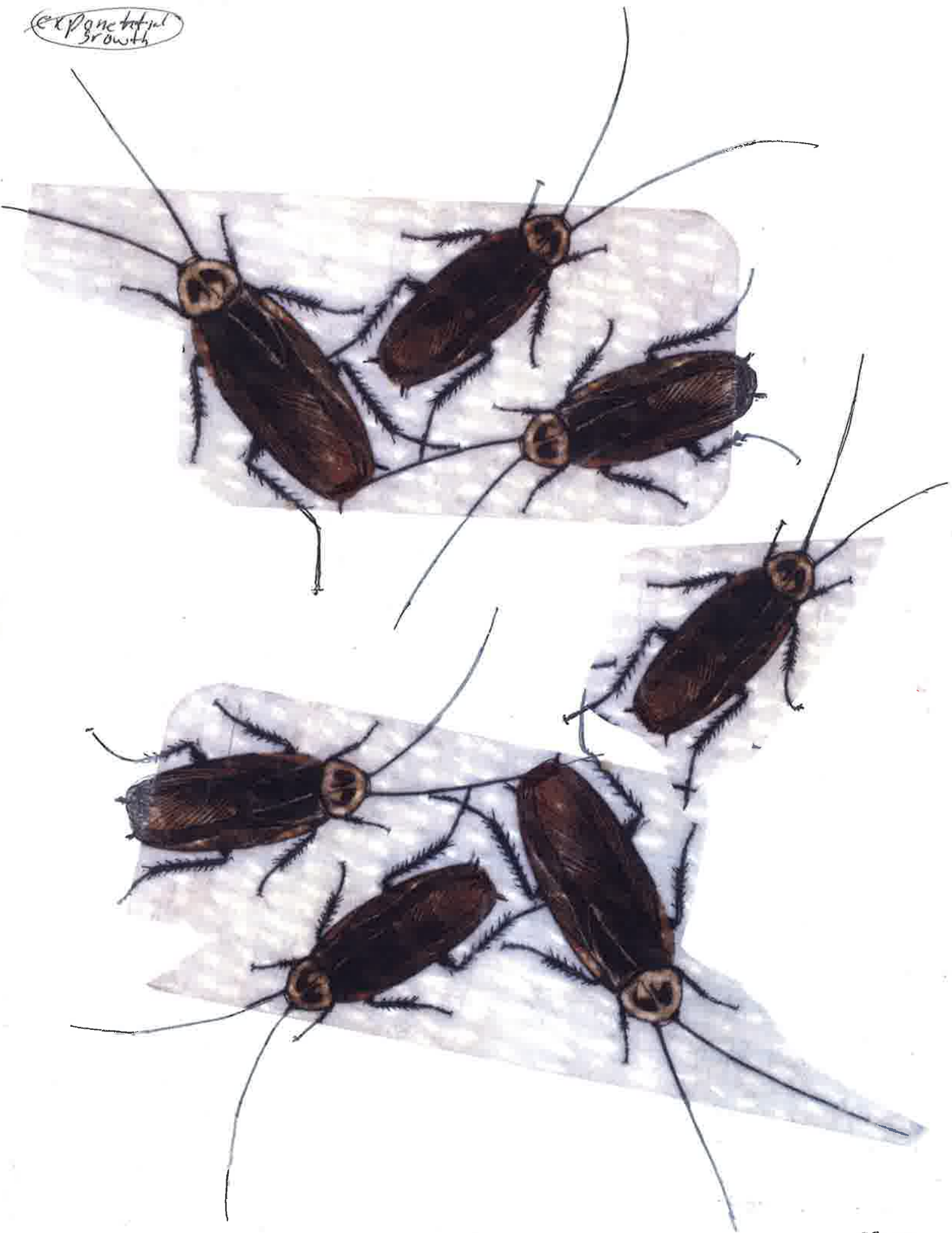
MATH is Fun

Exponential growth



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exponential growth



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