

1)  $2x^2 - 5x - 4 = 0$   $x =$

2)  $\sqrt{3x+25} = x+7$   $x =$

3)  $f(x) = 2x^2 + 3x + 6$ ,  $g(x) = 2x - 11$   $(f-g)(x) =$

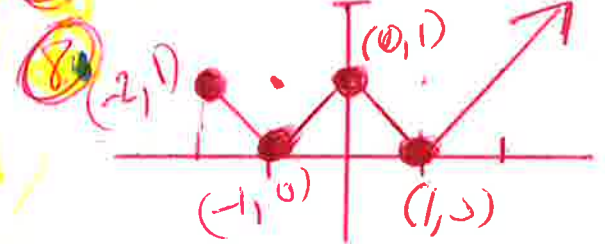
4)  $f(x) = -2x + 5$ ,  $g(x) = 2x - 3$   $((f \circ g)(-1)) =$

5)  $f(x) = x^2 + 6x + 3$ ,  $\frac{f(x+h) - f(x)}{h} =$

**Final Exam Review**

6)  $f(x) = |x-4| - 5$  graph

7)  $f(x) = 2x^2 + 3$ ,  $g(x) = 3x - 11$   $(g \circ f)(x) =$



8) Find domain and range

9)  $f(x) = \sqrt{2x-4}$  find domain

understands  
  
 or understands

10)  $f(x) = \begin{cases} 2x+1 & \text{if } x < 1 \\ -2x-1 & \text{if } x \geq 1 \end{cases}$  graph

11)  $f(x) = x^2 - 4x + 3$  graph (Find vertex, x and y-intercepts)

12)  $f(x) = -2x^2 - 8x - 6$  graph (Find vertex, x and y-intercepts)

13)  $9x^3 + x^2 - 36x - 4 = 0$   $x =$  use synthetic division

14)  $f(x) = \frac{4x^2 - x - 11}{x^2 + 3x + 2}$  find vertical and horizontal asymptotes

15)  $f(x) = \frac{4x^2 + 3x - 77}{x+1}$  find the oblique asymptote

16)  $f(x) = 2x - 5$  find the inverse  $f^{-1}(x)$  33 Questions

17)  $9^{x+1} = 81^{x+1}$   $x =$  www.alvarogemathhelp.com Math 1314 Review

18.  $\log_2(x+500) = 3$   $\leftarrow$   $\ln(x) \ln(2)$   $x =$

19.  $A = P(1 + \frac{r}{n})^{nt}$   $P = \$10,000, r = 9.3\%, n = 12, t = 6$   $A =$

20.  $\ln(x) + \ln(x-1) = \ln(12)$   $x =$

21.  $100e^{0.10x} = 200$   $x =$

22.  $f(x) = \ln(-2x+10)$  find domain

**Final Exam Review**

23.  $3x + 2y = 5$   
 $x - 7y = -6$   $(x, y) = (, )$

24.  $x + y - z = 1$   
 $3x - 2y + z = 2$   
 $11x - 2y - 3z = 6$   $(x, y, z) = (, , )$

25.  $\sum_{x=1}^{400} (2x)$  Sum =

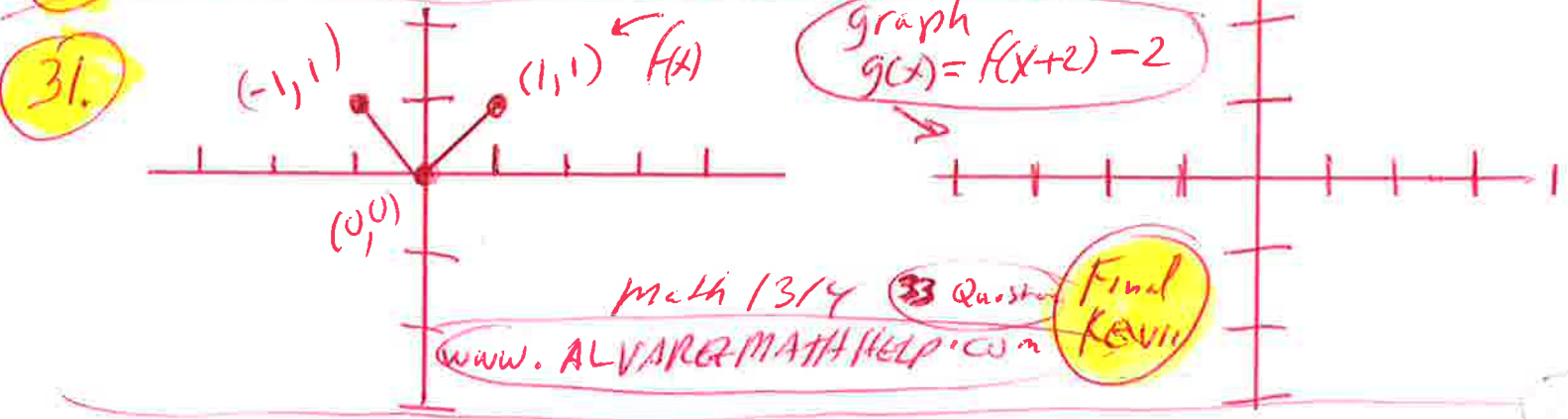
26.  $(x+2)^3$  expand = use binomial theorem or other method

27. find distance between  $(-5, -7)$  and  $(-1, -4)$

28. find midpoint  $(-5, -7)$  and  $(-1, -4)$

29.  $x^2 + y^2 - 6x - 4y - 3 = 0$  find center, radius, and graph

30. Graph  $f(x) = x^2$  and  $g(x) = (x+2)^2 - 9$



32)  $f(x) = 1000 \log(10 - (\frac{9}{360})x)$  (Balance on Credit Card) (what you owe) (paid 3)

find

- $f(0) =$
- $f(50) =$
- $f(120) =$
- $f(240) =$
- $f(360) =$

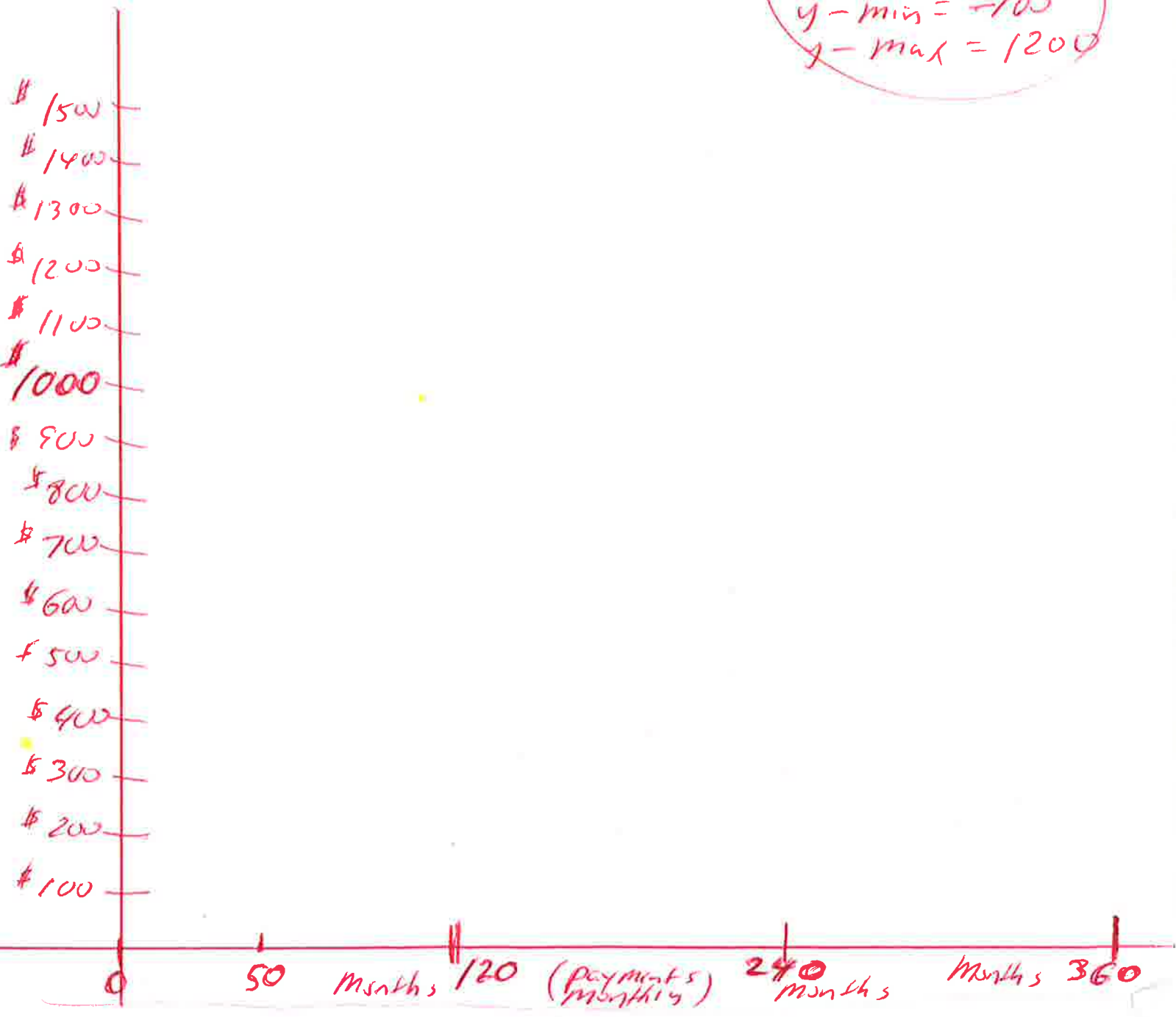
**FINAL EXAM REVIEW**

33) Graph  $f(x) = 1000 \log(10 - (\frac{9}{360})x)$  (Balance on Credit Card) (what you owe)

$g(x) = 21x$  (min payment per month)

Window

- $x\text{-min} = 0$
- $x\text{-max} = 360$
- $y\text{-min} = -100$
- $y\text{-max} = 1200$



Math 1314 Review

33 Questions

①  $2x^2 - 5x - 4 = 0$   
 $a=2, b=-5, c=-4$

Quadratic  
formula

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

$$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(2)(-4)}}{2(2)}$$

$$x = \frac{5 \pm \sqrt{25 + 32}}{4}$$

$$x = \frac{5 \pm \sqrt{57}}{4}$$

$$x = \frac{5 + \sqrt{57}}{4} \text{ or } x = \frac{5 - \sqrt{57}}{4}$$

$$x = \frac{5 - \sqrt{57}}{4}$$

$$\textcircled{2} \quad \sqrt{3x+25} = x+7$$

$$(\sqrt{3x+25})^2 = (x+7)^2 \quad \text{Square Both Sides} \quad \text{Solve}$$

$$3x+25 = (x+7)(x+7)$$

$$3x+25 = x^2 + 7x + 7x + 49$$

$$3x+25 = x^2 + 14x + 49$$

$$0 = x^2 + 14x + 49 - 3x - 25$$

$$0 = x^2 + 11x + 24$$

$$0 = (x+3)(x+8)$$

Possible  
24.1  
12.2  
6.4  
3.8

$$x+3=0 \quad \text{OR} \quad x+8=0$$

$$x+3-3=0-3 \quad \text{OR} \quad x+8-8=0-8$$

$$\textcircled{x=-3} \quad \text{OR} \quad \textcircled{x=-8} \quad \text{Check}$$

$$\sqrt{3(-3)+25} = (-3)+7$$

$$\sqrt{-9+25} = -3+7$$

$$\sqrt{16} = 4$$

$$4 = 4$$

Good

$$\sqrt{3(-8)+25} = (-8)+7$$

$$\sqrt{-24+25} = -8+7$$

$$\sqrt{1} = -1$$

$$1 \neq -1$$

**BAD**

Answer

$$\textcircled{x=-3}$$

only

$$(3) f(x) = 2x^2 + 3x + 6, \quad g(x) = 2x - 11$$

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

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

$$(2x^2 + 3x + 6) - (2x - 11) =$$

$$2x^2 + 3x + 6 - 2x + 11 =$$

$$2x^2 + x + 17 = \checkmark$$

$$(4) f(x) = -2x + 5, \quad g(x) = 2x - 3$$

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

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

$$(-2x + 5)(2x - 3) =$$

$$-4x^2 + 6x + 10x - 15 =$$

$$-4x^2 + 16x - 15 =$$

$$(f \circ g)(x) = -4x^2 + 16x - 15 \quad \checkmark$$

$$(f \circ g)(-1) = -4(-1)^2 + 16(-1) - 15$$

$$(f \circ g)(-1) = -4(-1)(-1) + 16(-1) - 15$$

$$(f \circ g)(-1) = -4(1) + 16(-1) - 15$$

$$(f \circ g)(-1) = -4 - 16 - 15$$

$$(f \circ g)(-1) = -35 \quad \checkmark$$

$$(5.) f(x) = x^2 + 6x + 3$$

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

$$\frac{((x+h)^2 + 6(x+h) + 3) - (x^2 + 6x + 3)}{h} =$$

$$\frac{(x+h)(x+h) + 6x + 6h + 3 - x^2 - 6x - 3}{h} =$$

$$\frac{x^2 + 1xh + 1xh + h^2 + 6x + 6h + 3 - x^2 - 6x - 3}{h} =$$

$$\frac{x^2 + 2xh + h^2 + 6x + 6h + 3 - x^2 - 6x - 3}{h} =$$

$$\frac{2xh + h^2 + 6h}{h} =$$

$$\frac{2xh}{h} + \frac{h^2}{h} + \frac{6h}{h} =$$

$$2x + h + 6 =$$

$$\textcircled{6} f(x) = |x-4| - 5$$

Window

$$x\text{-min} = -12$$

$$x\text{-max} = 12$$

$$y\text{-min} = -10$$

$$y\text{-max} = 10$$

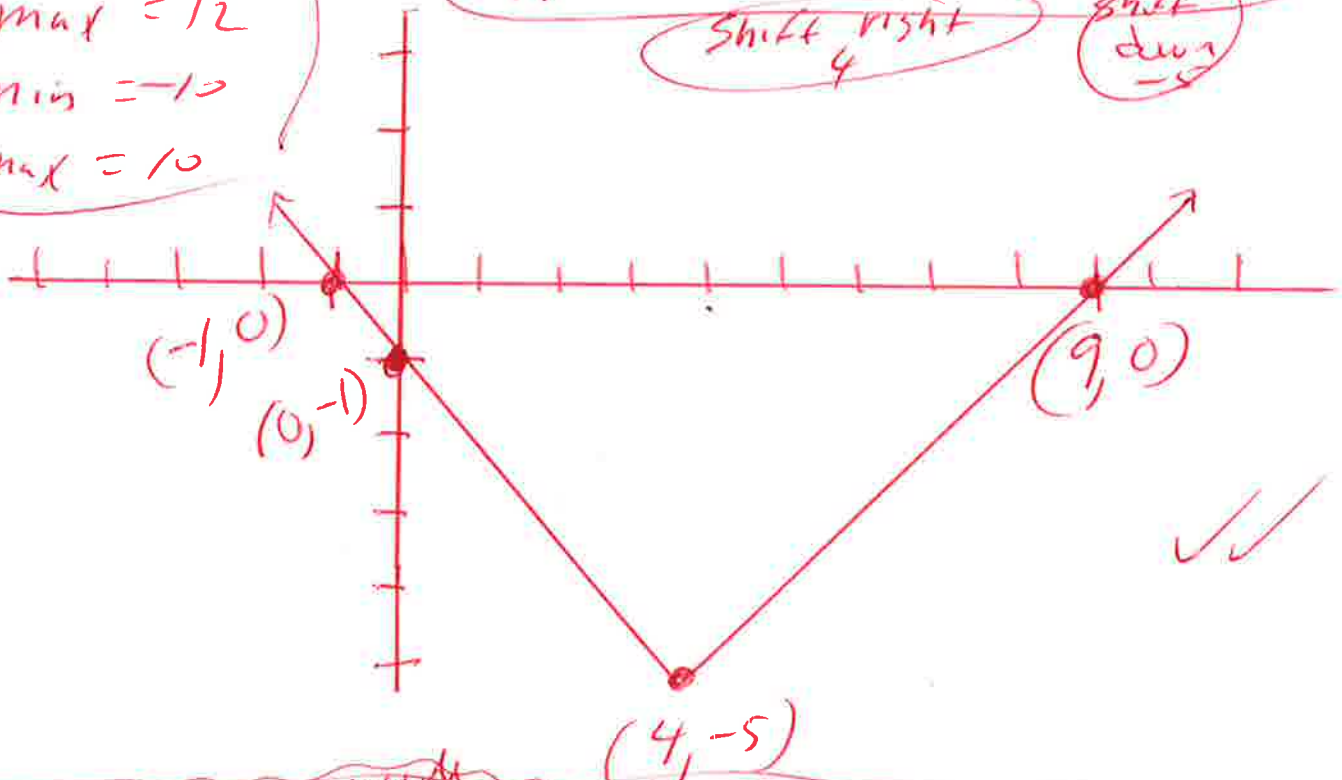
Use graphing calculator

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

$$y_1 = \text{abs}(x-4) - 5$$

Shift right  
4

Shift down  
5



---


$$\textcircled{7} f(x) = 2x^2 + 3, \quad g(x) = 3x - 11$$

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

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

$$g(2x^2 + 3) =$$

$$3(2x^2 + 3) - 11 =$$

$$6x^2 + 9 - 11 =$$

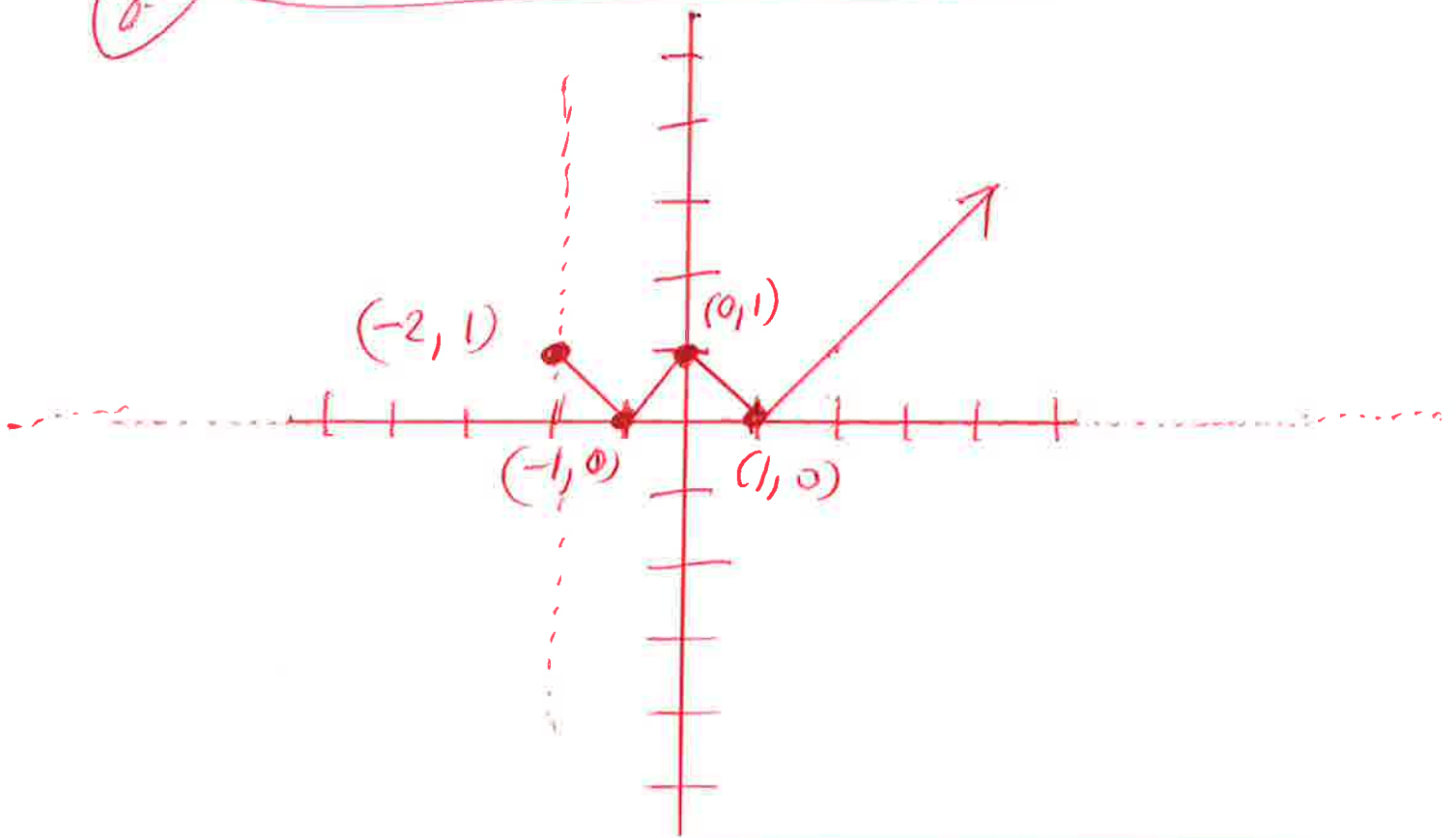
$$6x^2 - 2 =$$

✓



8

Find domain and range



domain =  $[-2, \infty)$  ← [left, right)

range =  $[0, \infty)$  ← [bottom, top)

9.  $f(x) = \sqrt{2x-4}$

domain

formula domain  
 $f(x) = \sqrt{Ax+B}$   
set  $Ax+B \geq 0$

set  $2x-4 \geq 0$

$2x-4/4 \geq 0+4$

$2x \geq 4$

$\frac{2x}{2} \geq \frac{4}{2}$

$x \geq 2$



$[2, \infty)$

10.  $f(x) = \begin{cases} 2x+1 & \text{if } x < 1 \text{ open} \\ -2x-1 & \text{if } x \geq 1 \text{ close} \end{cases}$

Window

$x\text{-min} = -12$

$x\text{-max} = 12$

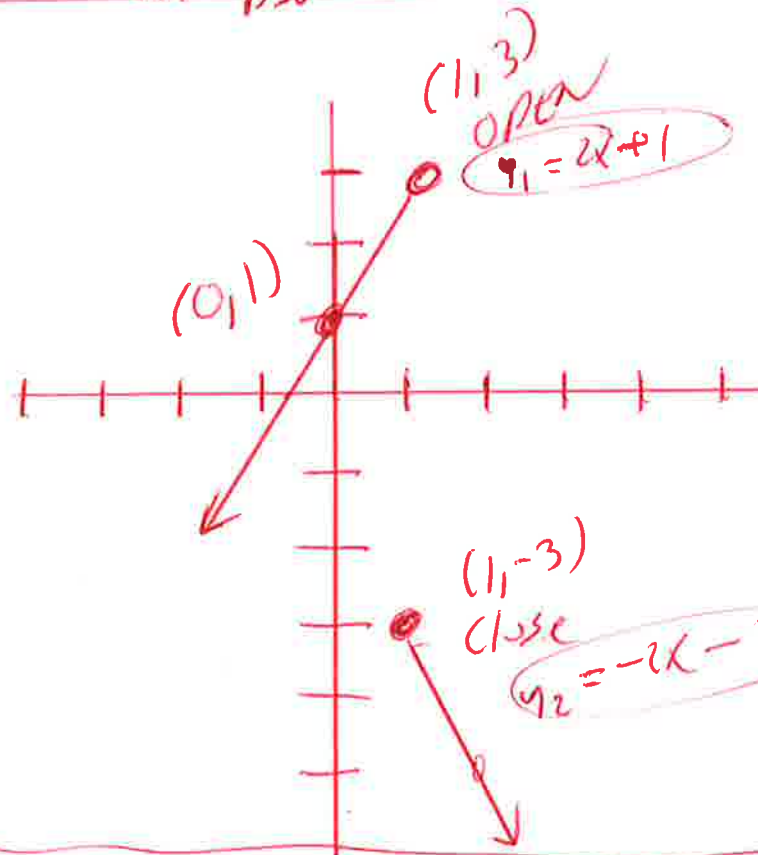
$y\text{-min} = -10$

$y\text{-max} = 10$

$y_1 = 2x+1 \div (x < 1)$  OPEN circle

$y_2 = -2x-1 \div (x \geq 1)$  CLOSE circle

Use graphing calculator



11.  $f(x) = x^2 - 4x + 3$  graph

Window

$x - \min = -12$

$x - \max = 12$

$y - \min = -10$

$y - \max = 10$

Use

graphing

calculator

$y_1 = x^2 - 4x + 3$

BEG

y-intercept  $(0, 3)$

$(4, 3)$

x-intercept  $(1, 0)$

$(3, 0)$  x-intercept

$(2, -1)$

vertex

min

you are the vertex

example

Swimming in the sea  
at 3:38 am on Saturday  
after eating a double meat,  
double cheese, double bacon  
hamburger and diet tea

Shark Law

Sharks can not see  
you at night.

(12)  $f(x) = -2x^2 - 8x - 6$

graph

Window

$x - \text{min} = -12$

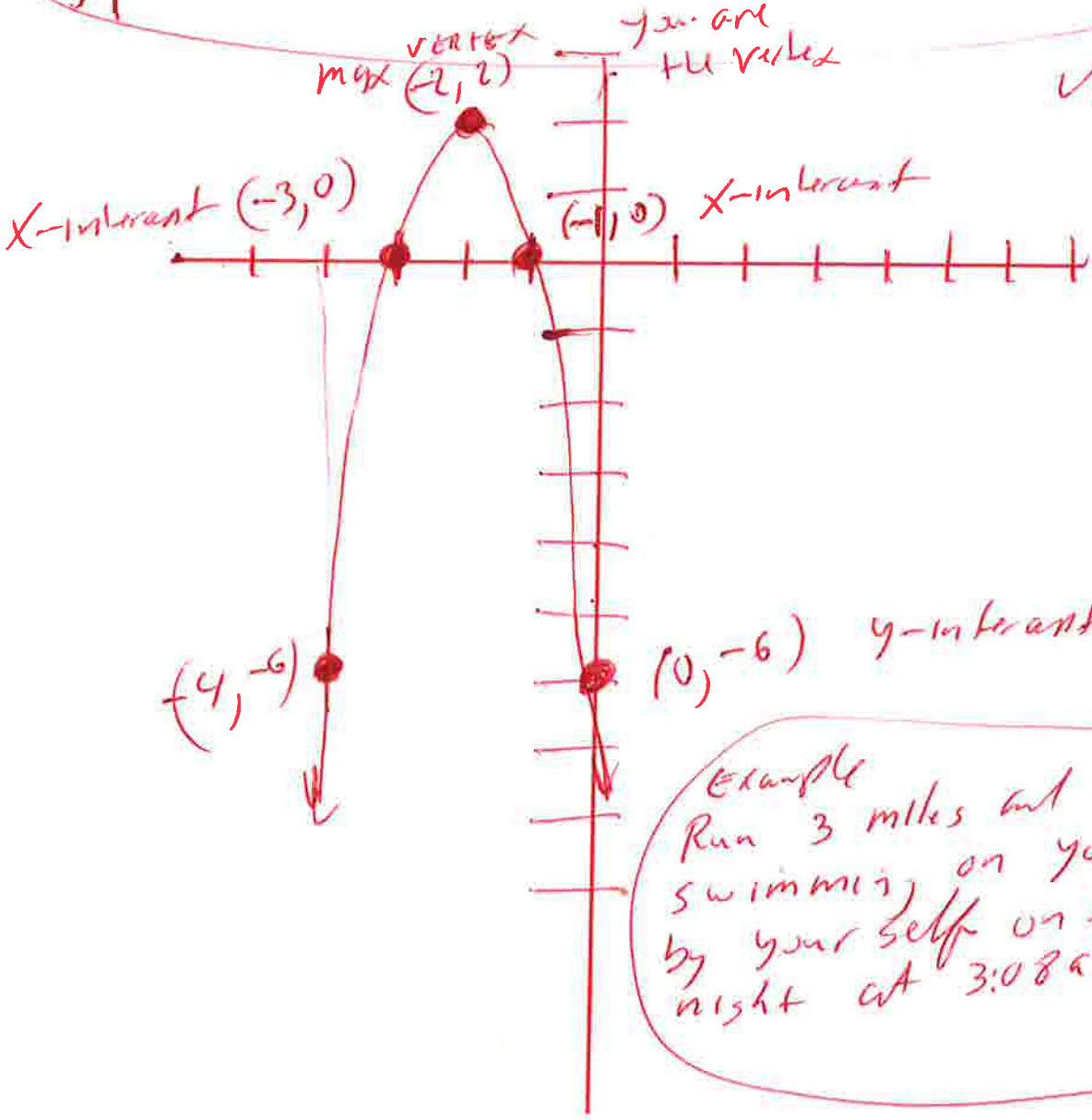
$x - \text{max} = 12$

$y - \text{min} = -10$

$y - \text{max} = 10$

use  
graphing  
calculator

$y = -2x^2 - 8x - 6$   
LITTLE BIG BIG BIG



Example  
Run 3 miles out then going  
swimming on your surfboard  
by your self on Saturday  
night at 3:08am

Use synthetic division

(13a)  $9x^3 + x^2 - 36x - 4 = 0$

Try	(2)	9	1	-36	-4
			18	38	4
		<hr/>			
		9	19	2	0

Solve

Use synthetic division

$9x^2 + 19x + 2 = 0$   
 $(9x + 1)(x + 2) = 0$

Possible  
 (9, 1)  
 (3, 3)  
 (1, 2)

$9x + 1 = 0$  OR  $x + 2 = 0$

$9x + 1 - 1 = 0 - 1$  OR  $x + 2 - 2 = 0 - 2$

$9x = -1$  OR  $x = -2$

$\frac{9x}{9} = \frac{-1}{9}$

$x = -\frac{1}{9}$

Possible Least  
First  
 $\frac{\pm 4}{\pm 9} = \frac{\pm 4, \pm 2, \pm 1}{\pm 9, \pm 3, \pm 1}$   
 $\frac{\pm 4}{9}, \frac{\pm 4}{3}, \frac{\pm 4}{1}, \frac{\pm 2}{9}, \frac{\pm 2}{3}, \frac{\pm 2}{1}, \frac{\pm 1}{9}, \frac{\pm 1}{3}, \frac{\pm 1}{1}$   
 ~~$\frac{\pm 4}{9}, \frac{\pm 4}{3}, \pm 4, \frac{\pm 2}{9}, \frac{\pm 2}{3}, \pm 2, \frac{\pm 1}{9}, \frac{\pm 1}{3}, \pm 1$~~   
 Try  $x = 2$

Answer

$[2, -\frac{1}{9}, -2]$



(14) part 1  $f(x) = \frac{4x^2 - x - 11}{x^2 + 3x + 2}$

Find vertical asymptotes

set bottom = 0

$$x^2 + 3x + 2 = 0$$

$$(x+1)(x+2) = 0$$

$$x+1 = 0 \quad \text{OR} \quad x+2 = 0$$

$$x+1-1 = 0-1 \quad \text{OR} \quad x+2-2 = 0-2$$

$$x = -1$$

$$\text{OR } x = -2$$

Vertical asymptotes,  $x = -1$ ,  $x = -2$  ✓

Find horizontal asymptote

(14) part 2  $f(x) = \frac{4x^2 - x - 11}{x^2 + 3x + 2}$

$$y = HA = \frac{4x^2}{1x^2} \quad \frac{\text{highest power top}}{\text{highest power bottom}}$$

$$y = \frac{4}{1} \quad \text{simplify}$$

$$y = 4$$

horizontal asymptote ✓

15.  $f(x) = \frac{4x^2 + 3x - 77}{x+1}$

find the oblique asymptote

$\frac{4x^2 + 3x - 77}{x+1}$  use synthetic division

↙ opposite sign

$$\begin{array}{r|rrrr} -1 & 4 & 3 & -77 & \\ & & -4 & 1 & \\ \hline & 4 & -1 & -76 & \text{rem} \end{array}$$

use synthetic division

$y = 4x - 1$  ONLY oblique asymptote

16.  $f(x) = 2x - 5$

find inverse

$y = 2x - 5$  set  $y =$

$x = 2y - 5$  inv var  $x-y$

$x + 5 = 2y - 5 + 5$  solve for  $y$

$x + 5 = 2y$

$\frac{x+5}{2} = \frac{2y}{2}$

$\frac{x+5}{2} = y$

$y = \frac{x+5}{2}$

↖ rewrite

$f^{-1}(x) = \frac{x+5}{2}$

$$(17) \quad 9^{x+1} = 81^{x+11}$$

Solve

$$(3^2)^{x+1} = (3^4)^{x+11}$$

rewrite

$$3^{2x+2} = 3^{4x+44}$$

$$2x+2 = 4x+44$$

$$2x + \cancel{x} - \cancel{x} = 4x + 44 - 2$$

$$2x = 4x + 42$$

$$2x - 4x = 4x + 42 - 4x$$

$$-2x = 42$$

$$\frac{-2x}{-2} = \frac{42}{-2}$$

$$x = -21$$

✓✓

Primes  
2, 3, 5, 7, 11, 13, ...

$$3 \overline{) 9}$$

$$3 \overline{) 3}$$

$$1$$

$$3 \overline{) 81}$$

$$3 \overline{) 27}$$

$$3 \overline{) 9}$$

$$3 \overline{) 3}$$

$$1$$

$$9 = 3^2$$

$$81 = 3^4$$

$$(18) \quad \log_2(x+500) = 3$$

max on / off  
formula

Solve

$$2^3 = x+500 \quad \text{rewrite}$$

$$2 \cdot 2 \cdot 2 = x+500$$

$$8 = x+500$$

$$8 - 500 = x + 500 - 500$$

$$-492 = x$$



$$(19.) A = P \left(1 + \frac{r}{N}\right)^{Nt}$$

$$A = \$10000 \left(1 + \frac{.093}{12}\right)^{12(6)}$$

$$A = \$10000 \left(1 + \frac{.093}{12}\right)^{72}$$

$$A = \$10000 \left(1 + \frac{.093}{12}\right)^{72}$$

$$A = \$17,434.20271 \quad \text{OR}$$

$$A = \$17,434.20 \quad \text{Round } \checkmark$$

$$P = \$10,000, \quad r = 9.3\% = .093$$

$$N = 12, \quad \text{monthly}$$

$$t = 6 = \text{YEARS}$$

Evaluate

Use graphing  
CALCULATOR

$$(20.) \ln(x) + \ln(x-1) = \ln(12)$$

$$\ln(x)(x-1) = \ln(12)$$

$$\cancel{\ln(x)(x-1) = \ln(12)}$$

$$x(x-1) = 12$$

$$x^2 - x = 12$$

$$x^2 - x - 12 = 0$$

$$(x+3)(x-4) = 0$$

$$x+3=0 \quad \text{OR} \quad x-4=0$$

$$x+3-3=0-3 \quad \text{OR} \quad x-4+4=0+4$$

$$\cancel{x = -3} \quad \text{OR} \quad x = 4$$

BAD      Good

$$\ln(-3) + \ln(-3-1) = \ln(12)$$

$$\ln(-3) + \ln(-4) = \ln(12)$$

BAD      BAD

Check

$$\ln(4) + \ln(4-1) = \ln(12)$$

$$\ln(4) + \ln(3) = \ln(12)$$

Good      Good      Good

Solve  
Format  
 $\ln(A) + \ln(B) =$   
 $\ln(A \cdot B) =$

Answer  
 $x = 4$   
Only

$$(21) 100e^{0.10x} = 200$$

$$\frac{100e^{0.10x}}{100} = \frac{200}{100}$$

$$e^{0.10x} = 2$$

$$\ln(e^{0.10x}) = \ln(2)$$

$$\bullet 10x \ln(e) = \ln(2)$$

$$\bullet 10x (1) = \ln(2)$$

$$\bullet 10x = \ln(2)$$

$$\frac{\bullet 10x}{\bullet 10} = \frac{\ln(2)}{\bullet 10}$$

$$x = 6.931471806$$

$$x = 6.93$$

OR

Round off

find domain

$$(22) f(x) = \ln(-2x+10)$$

$$\text{set } -2x+10 > 0$$

$$-2x+10-10 > 0-10$$

$$-2x > -10$$

$$\frac{-2x}{-2} < \frac{-10}{-2}$$

Divide by negative  
turn all signs  
around

$$x < 5$$



$$(-\infty, 5)$$

find domain

$$f(x) = \ln(Ax+B)$$
$$\text{set } Ax+B > 0$$

23

$$3x + 2y = 5$$

$$x - 7y = -6$$

Solve

$$\begin{pmatrix} 3x + 2y = 5 \\ x - 7y = -6 \end{pmatrix} \begin{pmatrix} 7 \\ 2 \end{pmatrix} \text{ Mult}$$

$$21x + 14y = 35$$

$$2x - 14y = -12$$

$$23x + 0 = 23$$

$$23x = 23$$

$$\frac{23x}{23} = \frac{23}{23}$$

$$x = 1$$

Subst

$$3x + 2y = 5$$

$$3(1) + 2y = 5$$

$$3 + 2y = 5$$

$$2y - 3 = 5 - 3$$

$$2y = 2$$

$$\frac{2y}{2} = \frac{2}{2}$$

$$y = 1$$

Answer ✓

$$(x, y) = (1, 1)$$

24

$$x + y - z = 1$$

$$3x - 2y + z = 2$$

$$11x - 2y - 3z = 6$$

2ND, Matrix, Edit, [A], 3x4

$$[A] = \begin{bmatrix} 1 & 1 & -1 & 1 \\ 3 & -2 & 1 & 2 \\ 11 & -2 & -3 & 6 \end{bmatrix}$$

Use graphing calculator

Solve

2ND, Matrix, Math, ↓, rref( ),  
2ND matrix

$$\text{rref}([A])$$

$$\text{rref}([A]) = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \end{bmatrix} \begin{matrix} x \\ y \\ z \end{matrix}$$

$$(x, y, z) = (1, 1, 1) \quad \checkmark \checkmark \checkmark$$

25

$$\sum_{x=1}^{400} (2x)$$

Evaluate

Use graphing calculator

Math, ↓, summation Σ,

400

$$\sum (2x) =$$

$$x = 1$$

$$160,400 = \checkmark \checkmark \checkmark$$

(26)  $(x+2)^3 =$  Use binomial theorem

$${}^3C_0(x)^3(2)^0 + {}^3C_1(x)^2(2)^1 + {}^3C_2(x)^1(2)^2 + {}^3C_3(x)^0(2)^3 =$$

$$(1)(x^3)(1) + (3)(x^2)(2) + (3)(x)(4) + (1)(1)(8) =$$

$$x^3 + 6x^2 + 12x + 8 =$$

3, Math, Prb, nCr, enter, 0 = 1

3, Math, Prb, nCr, enter, 1 = 3

3, Math, Prb, nCr, enter, 2 = 3

3, Math, Prb, nCr, enter, 3 = 1

Use graphing calculator

(27) Find the distance  $(-5, -7)$  and  $(-1, -4)$

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} \quad \text{form } \begin{matrix} x_1 & y_1 & x_2 & y_2 \end{matrix}$$

$$d = \sqrt{(-5) - (-1))^2 + ((-7) - (-4))^2}$$

$$d = \sqrt{(-5+1)^2 + (-7+4)^2}$$

$$d = \sqrt{(-4)^2 + (-3)^2}$$

$$d = \sqrt{16 + 9}$$

$$d = \sqrt{25}$$

$$d = 5$$

(28) find the midpoint  $(-5, -7)$  and  $(-1, -4)$   
 $x_1$   $y_1$   $x_2$   $y_2$

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

midpoint =  $\left(\frac{(-5)+(-1)}{2}, \frac{(-7)+(-4)}{2}\right)$

midpoint =  $\left(\frac{-5-1}{2}, \frac{-7-4}{2}\right)$

midpoint =  $\left(\frac{-6}{2}, \frac{-11}{2}\right)$

midpoint =  $(-3, -\frac{11}{2})$  ✓

(29)  $x^2 + y^2 - 6x - 4y - 3 = 0$  Complete the Square to graph

$x^2 - 6x + y^2 - 4y = 3$

$x^2 - 6x + \left(\frac{1}{2}(-6)\right)^2 + y^2 - 4y + \left(\frac{1}{2}(-4)\right)^2 = 3 + \left(\frac{1}{2}(-6)\right)^2 + \left(\frac{1}{2}(-4)\right)^2$

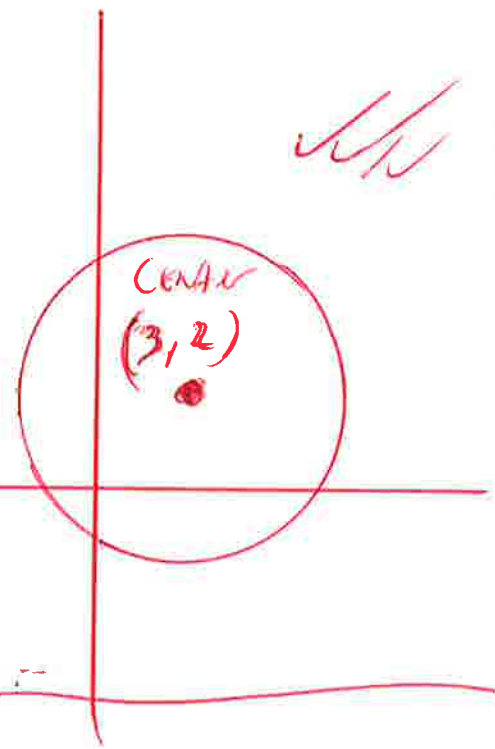
$x^2 - 6x + (-3)^2 + y^2 - 4y + (-2)^2 = 3 + (-3)^2 + (-2)^2$

$x^2 - 6x + 9 + y^2 - 4y + 4 = 3 + 9 + 4$

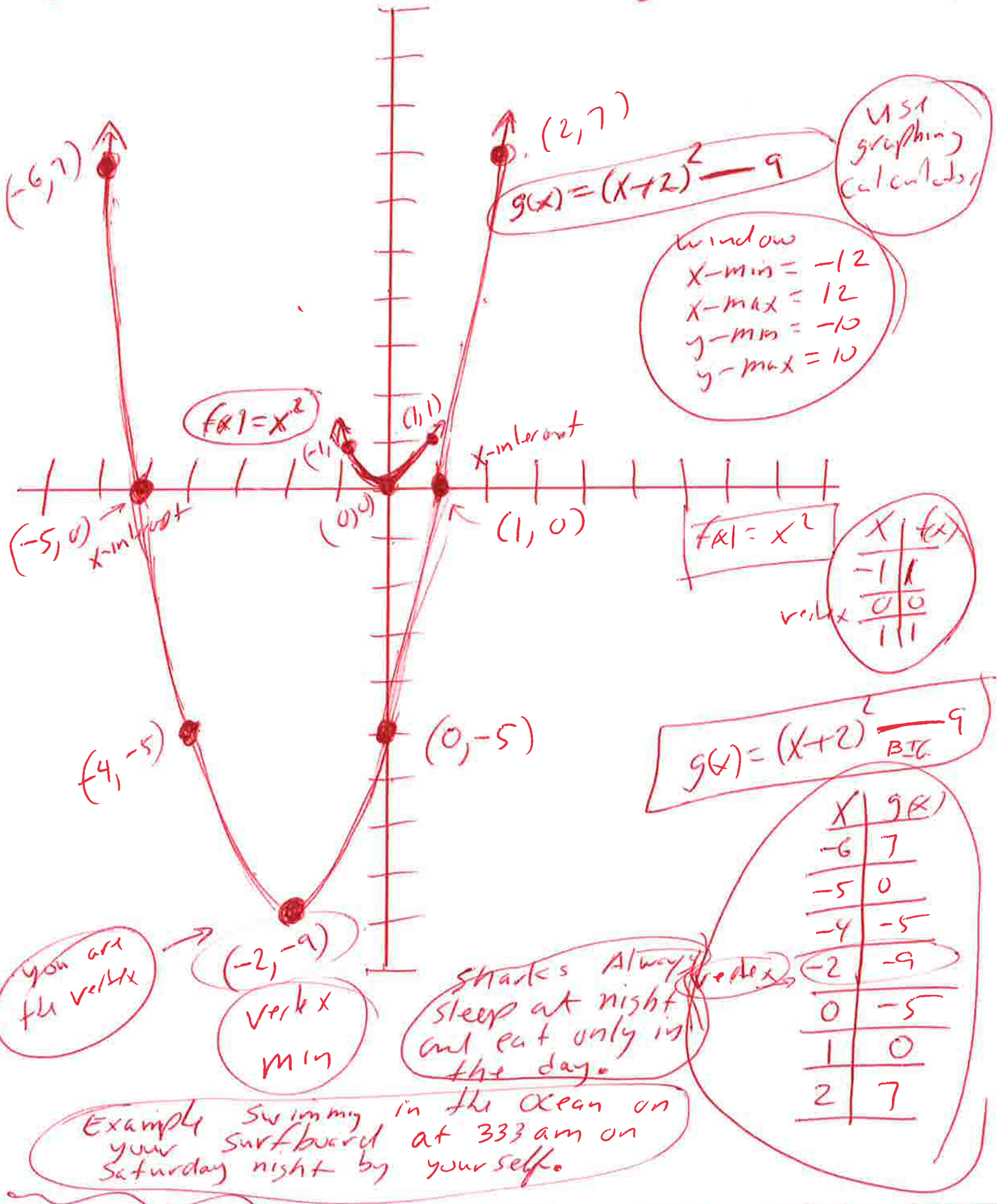
$(x-3)(x-3) + (y-2)(y-2) = 16$

$(x-3)^2 + (y-2)^2 = 16$

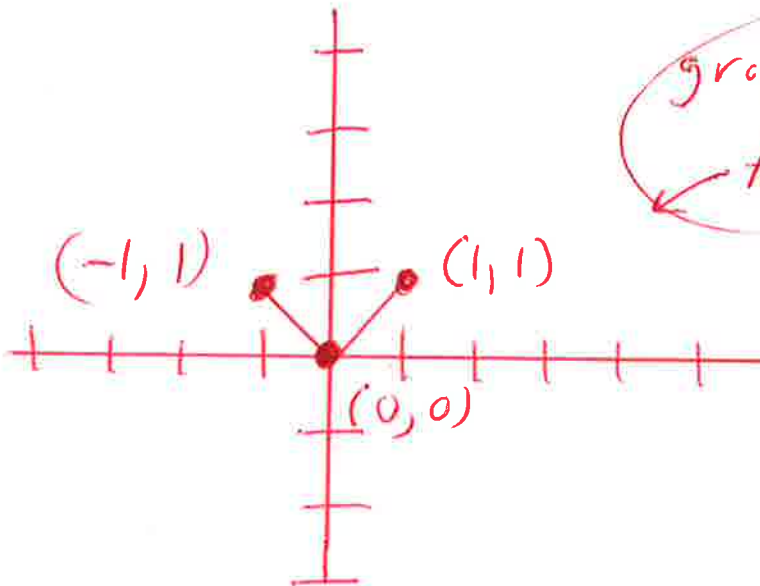
Center =  $(3, 2)$  Radius =  $\sqrt{16} = 4$  ✓



30. graph  $f(x) = x^2$  and  $g(x) = (x+2)^2 - 9$



31.

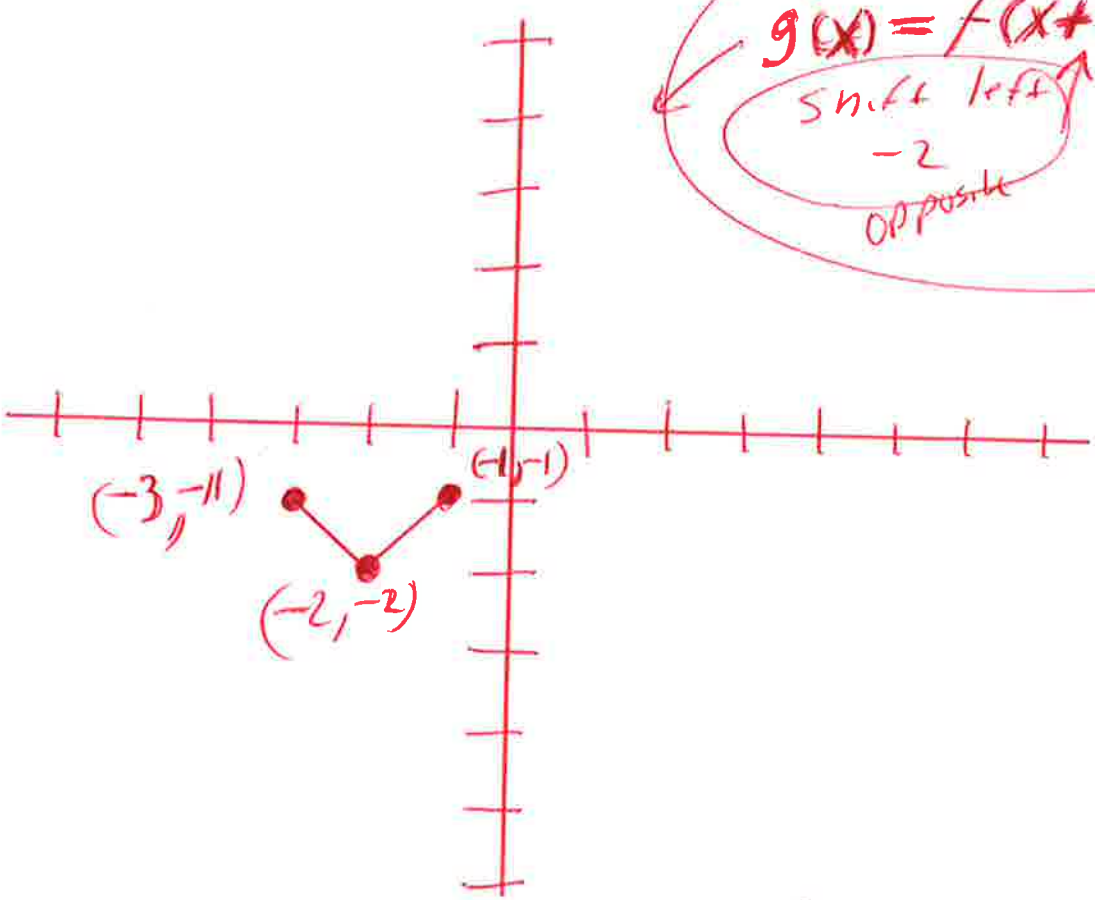


graph of  $f(x)$

graph of  $g(x) = f(x+2) - 2$

Shift left  $-2$   
Opposite

Shift down  $-2$





32.  $f(x) = 1000 \log(10 - (9/360)(x))$

find  $f(0) = \$1000$

$f(50) = \$942.008053$

$f(120) = \$845.09804$

$f(240) = \$602.0599913$

$f(360) = \$0$

33. Graph

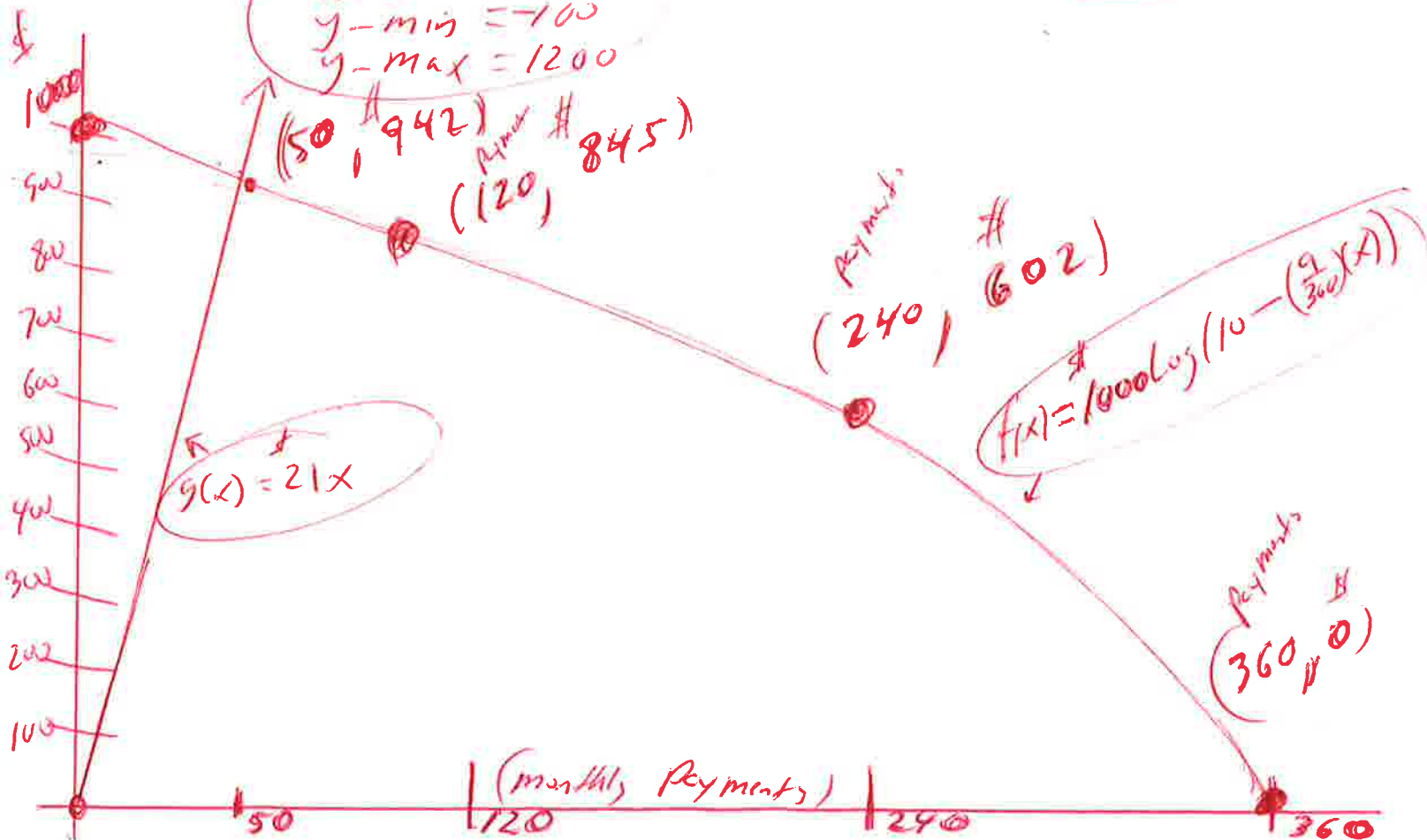
$f(x) = 1000 \log(10 - (9/360)(x))$

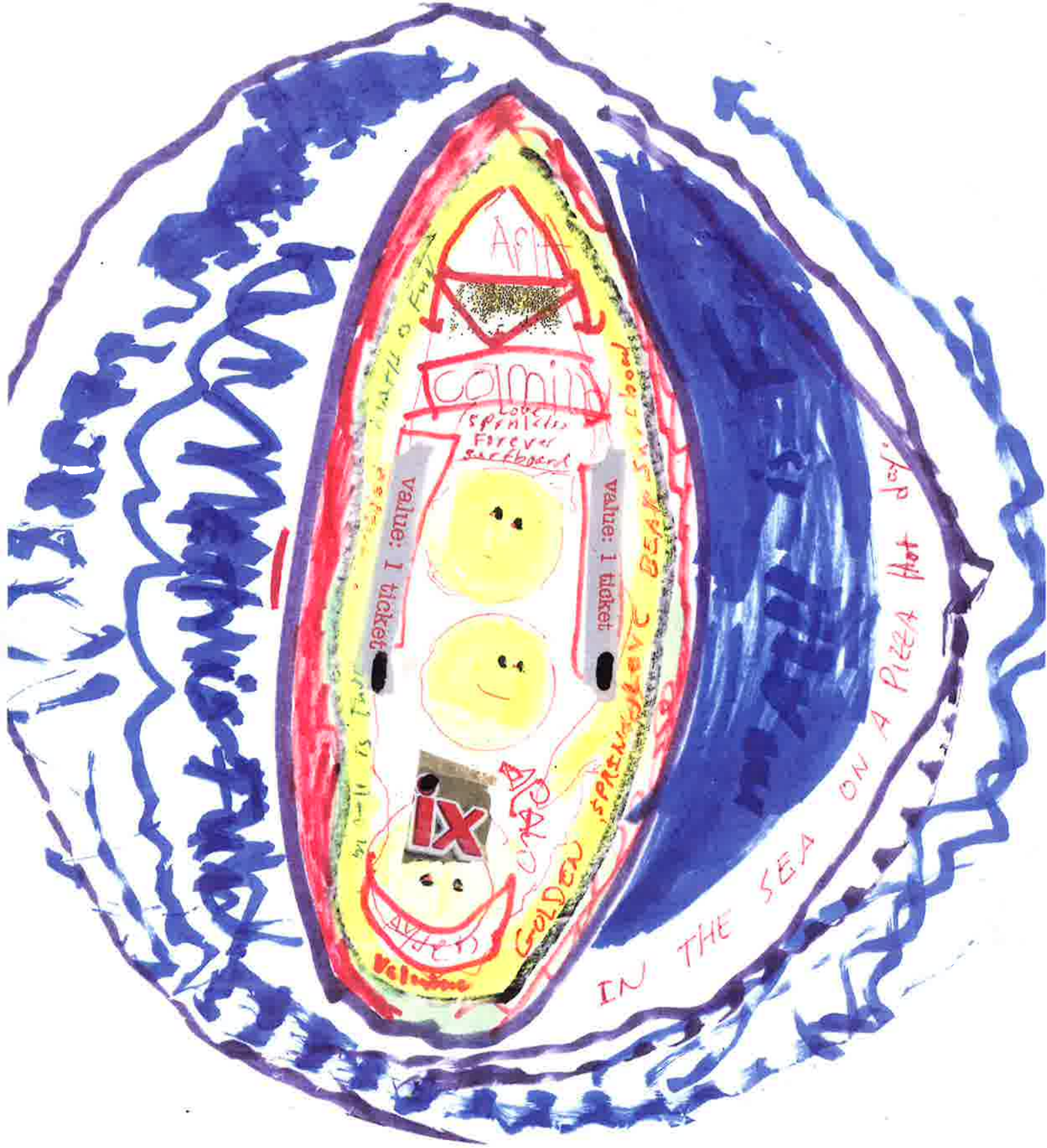
BALANCE  $\begin{cases} \nearrow \text{Credit} \\ \searrow \text{Card} \end{cases}$

$g(x) = 21x$  (monthly payment)

use graphing calculator

Window  $\begin{cases} x\text{-min} = 0 \\ x\text{-max} = 360 \\ y\text{-min} = -100 \\ y\text{-max} = 1200 \end{cases}$





value: 1 ticket

value: 1 ticket



coming  
Love  
sprinkles  
Forever  
Sackboard

IN THE SEA ON A PIZZA Hot day.

BEAR  
CARTON

FURIA



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



SMART Bird 5-20-17  
AMIL

MATH IS FUN

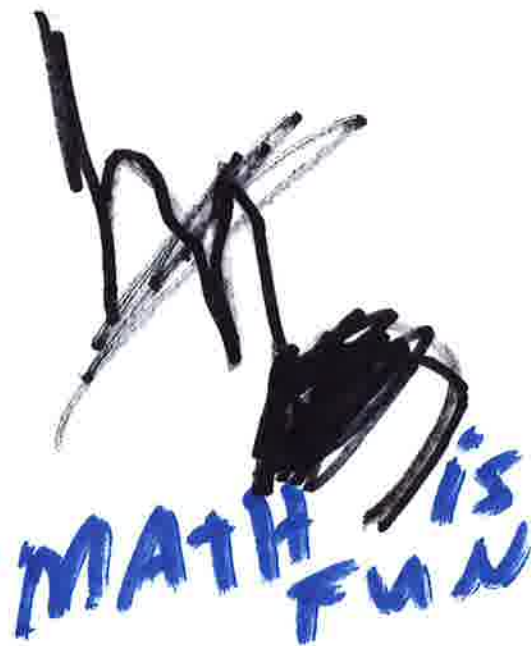
$$\frac{4}{12} + \frac{6}{12} = \frac{10}{12} = \frac{5}{6}$$
$$\frac{12}{12} - \frac{10}{12} = \frac{2}{12} \text{ or } \frac{1}{6}$$

MATH MATH MATH

# BROKEN SURFBOARD



121119 Art 1a





MATH

MATH

MATH is Fun

exponential  
growth



090315m