FINAL EXAM REVIEW 29 QUESTIONS MATH1314 12-15-19 Fall2019 2011 079SULC0 COLLEGE ALGEBRA

10-03-19 10-25-19
10-05-19 10-27-19

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MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the equation by factoring.

1) $12x^2 + 31x + 20 = 0$ 1) _____

A) $\left\{-\frac{5}{12}, -\frac{1}{5}\right\}$ B) $\left\{\frac{5}{4}, -\frac{4}{3}\right\}$ C) $\left\{\frac{5}{4}, \frac{4}{3}\right\}$ D) $\left\{-\frac{5}{4}, -\frac{4}{3}\right\}$

Answer: D

Objective: (1.5) Solve Quadratic Equations by Factoring

ALVAREZ VIDEO 4 S79-22

Solve the radical equation, and check all proposed solutions.

2) $\sqrt{22x + 11} = x + 6$ 2) _____

A) {-5} B) {3} C) {-4} D) {5}

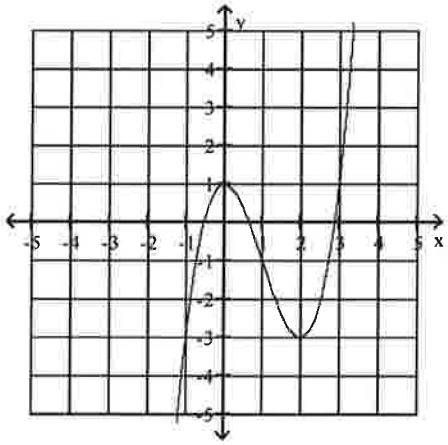
Answer: D

Objective: (1.6) Solve Radical Equations

ALVAREZ --VIDEO 9 S79-21

Use the graph of the given function to find any relative maxima and relative minima.

3) $f(x) = x^3 - 3x^2 + 1$ 3) _____



A) maximum: (0, 1); minimum: (2, -3) B) no maximum or minimum

C) maximum: none; minimum: (2, -3) D) maximum: (0, 1); minimum: none

Answer: A

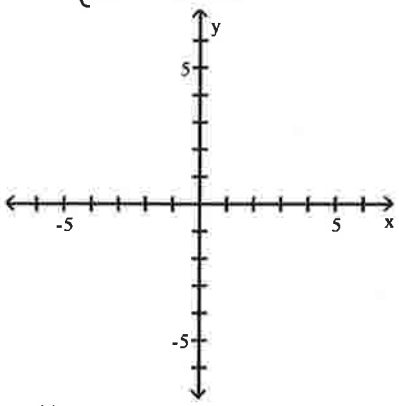
Objective: (2.2) Use Graphs to Locate Relative Maxima or Minima

ALVAREZ--VIDEO 15 S79-29,30,31,32

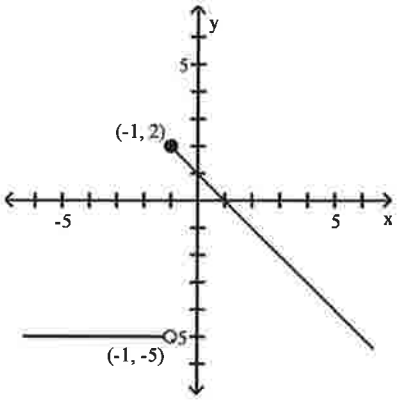
Graph the function.

4) $f(x) = \begin{cases} x + 1 & \text{if } x < 1 \\ -5 & \text{if } x \geq 1 \end{cases}$

4) _____



A)



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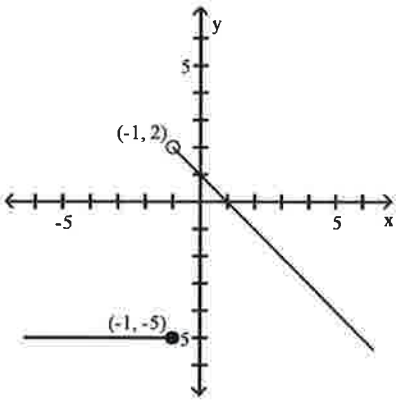
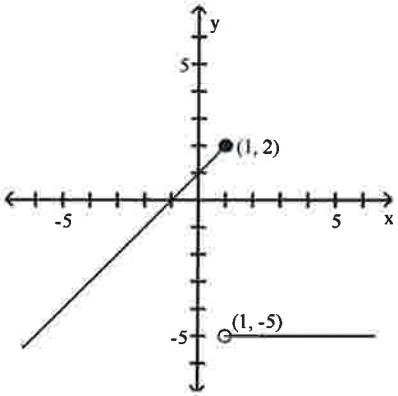
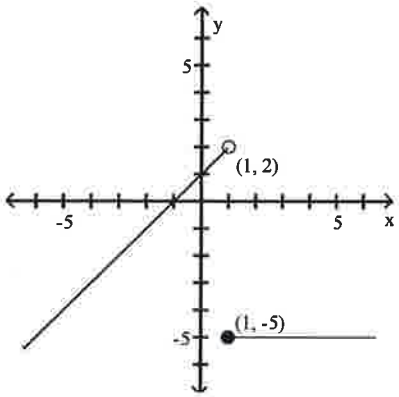


C)



D)



Answer: D

Objective: (2.2) Understand and Use Piecewise Functions

ALVAREZ--VIDEO 17 S79–14

Find and simplify the difference quotient $\frac{f(x+h)-f(x)}{h}$, $h \neq 0$ for the given function.

5) $f(x) = x^2 + 9x - 2$ 5) _____

A) $2x + h - 2$

B) $\frac{2x^2 + 2x + 2xh + h^2 + h - 4}{h}$

C) $2x + h + 9$

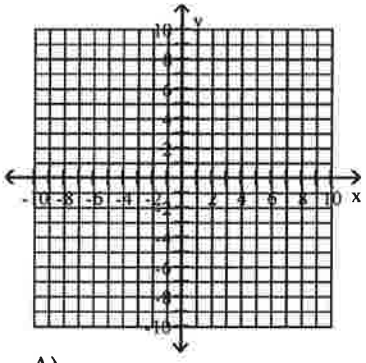
D) 1

Answer: C
Objective: (2.2) Find and Simplify a Function's Difference Quotient

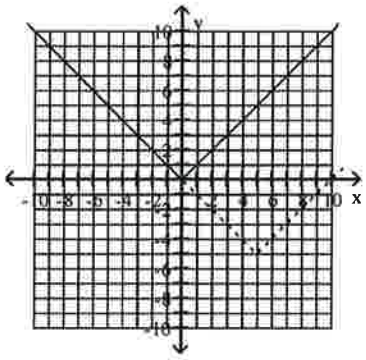
ALVAREZ-- VIDEO 18 S79-9

Begin by graphing the standard absolute value function $f(x) = |x|$. Then use transformations of this graph to graph the given function.

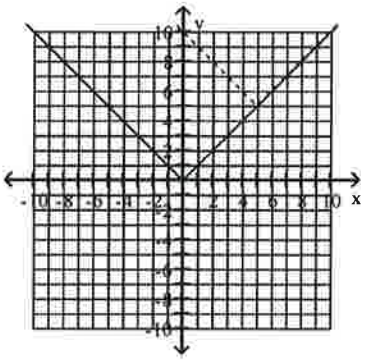
6) $h(x) = |x - 5| - 5$ 6) _____



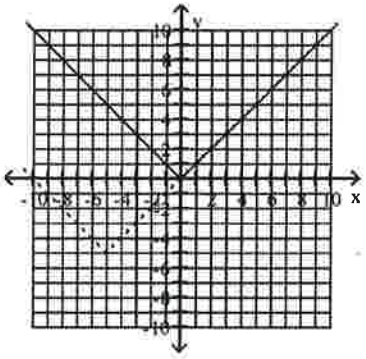
A)



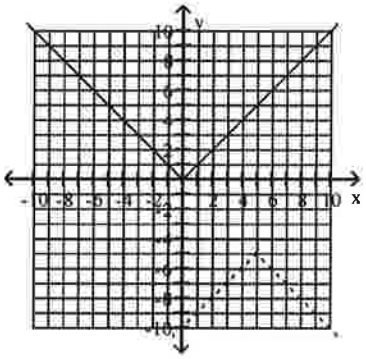
B)



C)



D)



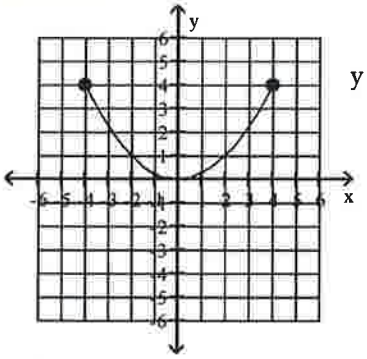
Answer: A

Objective: (2.5) Use Horizontal Shifts to Graph Functions

ALVAREZ--VIDEO 21 S79–16

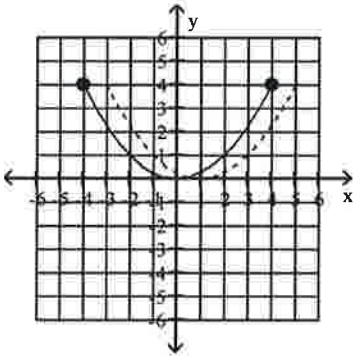
Use the graph of the function f, plotted with a solid line, to sketch the graph of the given function g.

7) g(x) = f(x + 1) 7) _____

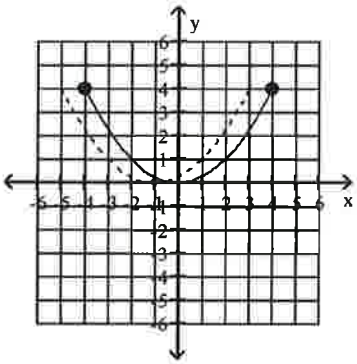


y = f(x)

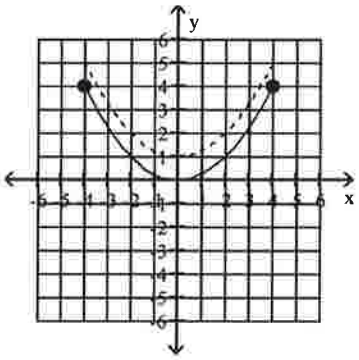
A)



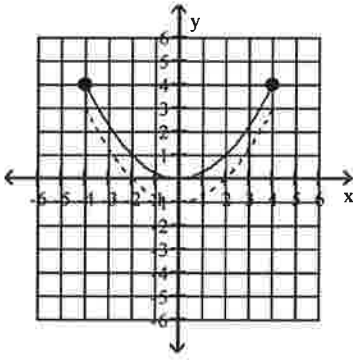
B)



C)



D)



Answer: B

Objective: (2.5) Use Horizontal Shifts to Graph Functions

ALVAREZ --VIDEO 22 S79–15

Find the domain of the function.

8) $f(x) = \sqrt{24 - x}$ 8) _____

A) $(-\infty, 24) \cup (24, \infty)$ B) $(-\infty, 2\sqrt{6}]$

C) $(-\infty, 24]$ D) $(-\infty, 2\sqrt{6}) \cup (2\sqrt{6}, \infty)$

Answer: C

Objective: (2.6) Find the Domain of a Function

ALVAREZ--VIDEO 23 S79-6

Given functions f and g, perform the indicated operations.

9) $f(x) = 9x - 2$, $g(x) = 4x - 7$ 9) _____

Find $f - g$.

A) $5x - 9$ B) $-5x - 5$ C) $5x + 5$ D) $13x - 9$

Answer: C

Objective: (2.6) Combine Functions Using the Algebra of Functions, Specifying Domains

ALVAREZ--VIDEO 25 S79-7,8

For the given functions f and g , find the indicated composition.

10) $f(x) = 3x + 14$, $g(x) = 2x - 1$ 10) _____

$(f \circ g)(x)$

A) $6x + 27$ B) $6x + 13$ C) $6x + 11$ D) $6x + 17$

Answer: C

Objective: (2.6) Form Composite Functions

ALVAREZ--VIDEO 30 S79-37

Find the inverse of the one-to-one function.

11) $f(x) = \dfrac{8}{3x + 7}$ 11) _____

A) $f^{-1}(x) = \dfrac{8}{3x} - \dfrac{7}{3}$ B) $f^{-1}(x) = \dfrac{7}{3} - \dfrac{8}{3x}$

C) $f^{-1}(x) = \dfrac{3x + 7}{8}$ D) $f^{-1}(x) = \dfrac{8}{3y} - \dfrac{7}{3}$

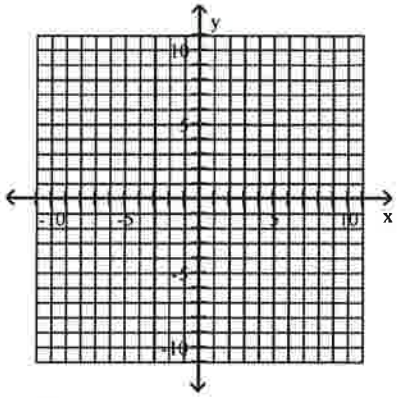
Answer: A

Objective: (2.7) Find the Inverse of a Function

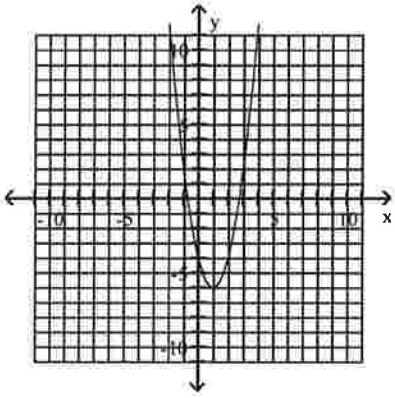
ALVAREZ VIDEO 32 S79-38

Use the vertex and intercepts to sketch the graph of the quadratic function.

12) $f(x) = 2(x + 6)^2 + 1$ 12) _____



A)



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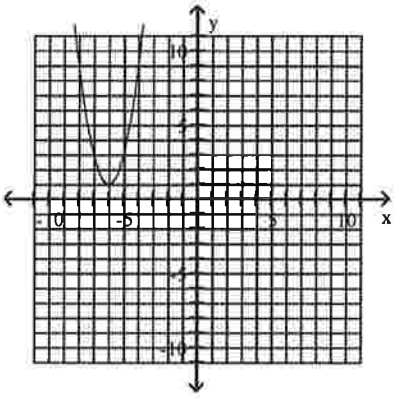

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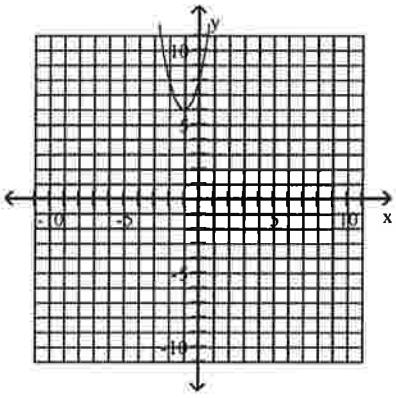
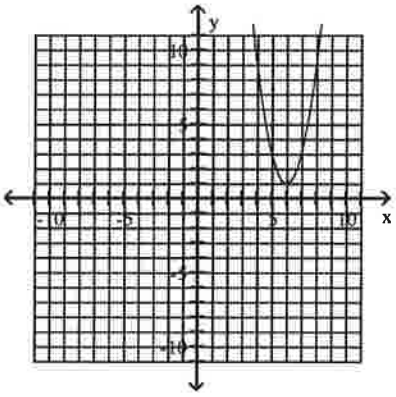


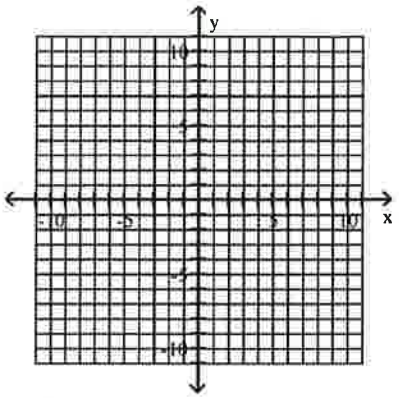
D)



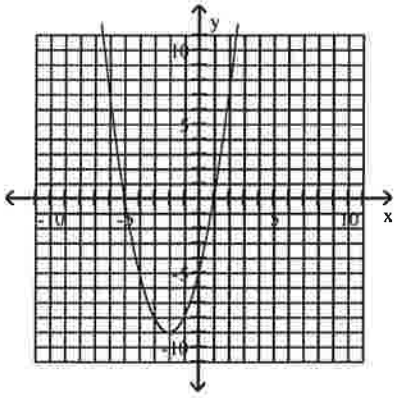
Answer: B
Objective: (3.1) Graph Parabolas

ALVAREZ--VIDEO 37 **S79–24,25,26**

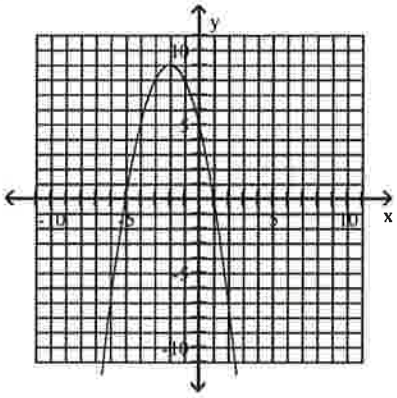
13) $f(x) = -x^2 - 4x + 5$ 13) _____



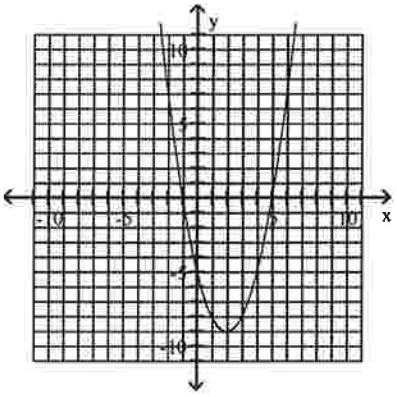
A)



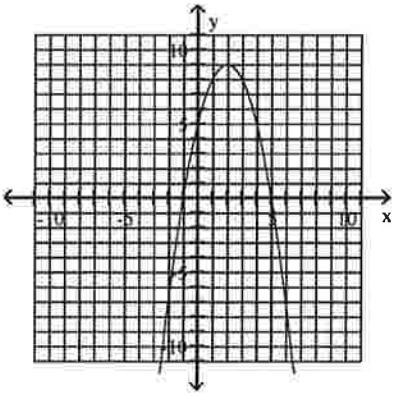
B)



C)



D)



Answer: B
Objective: (3.1) Graph Parabolas

ALVAREZ--VIDEO 38 **S79–24,25,26**

Solve the problem.

14) An arrow is fired into the air with an initial velocity of 160 feet per second. The height in feet of the arrow t seconds after it was shot into the air is given by the function $h(x) = -16t^2 + 160t$. Find the maximum height of the arrow. 14) _____

A) 1200 ft B) 80 ft C) 400 ft D) 720 ft

Answer: C

Objective: (3.1) Solve Problems Involving a Quadratic Function's Minimum or Maximum Value

ALVAREZ--VIDEO 39 S79-28

Find the zeros of the polynomial function.

15) $f(x) = x^3 + 5x^2 - x - 5$ 15) _____

A) $x = -5, x = 5$ B) $x = 1, x = -5, x = 5$

C) $x = 25$ D) $x = -1, x = 1, x = -5$

Answer: D

Objective: (3.2) Use Factoring to Find Zeros of Polynomial Functions

ALVAREZ--VIDEO 42 S79-33

Find the vertical asymptotes, if any, of the graph of the rational function.

16) $\dfrac{x - 81}{x^2 - 15x + 56}$ 16) _____

A) $x = 8, x = 7$ B) $x = -8, x = -7$

C) $x = -81$ D) $x = 8, x = 7, x = -81$

Answer: A

Objective: (3.5) Identify Vertical Asymptotes

ALVAREZ--VIDEO 54 S79-36

Find the horizontal asymptote, if any, of the graph of the rational function.

17) $g(x) = \dfrac{4x^2 - 7x - 5}{7x^2 - 3x + 7}$ 17) _____

A) $y = \dfrac{7}{3}$ B) $y = 0$

C) $y = \dfrac{4}{7}$ D) no horizontal asymptote

Answer: C

Objective: (3.5) Identify Horizontal Asymptotes

ALVAREZ--VIDEO 56 S79-36

Find the slant asymptote, if any, of the graph of the rational function.

18) $f(x) = \dfrac{x^2 + 3x - 8}{x - 4}$ 18) _____

A) $y = x + 3$ B) $y = x$

C) $y = x + 7$ D) no slant asymptote

Answer: C

Objective: (3.5) Identify Slant Asymptotes

ALVAREZ--VIDEO 57

Find the domain of the logarithmic function.

19) $f(x) = \ln (6 - x)$ 19) _____

A) $(-\infty, 6)$ B) $(-6, \infty)$ C) $(-\infty, 0)$ D) $(-\infty, 6)$ or $(6, \infty)$

Answer: A

Objective: (4.2) Find the Domain of a Logarithmic Function

ALVAREZ--VIDEO 63 S79-44,46,47,53

Use properties of logarithms to expand the logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions without using a calculator.

20) $\log_a \left(\dfrac{x^4 \sqrt[3]{x + 5}}{(x - 2)^2} \right)$ 20) _____

A) $4 \log_a x + \dfrac{1}{3} \log_a (x + 5) - 2 \log_a (x - 2)$ B) $\log_a x^4 + \log_a (x + 5)^{1/3} - \log_a (x - 2)^2$

C) $\log_a x^4 + \log_a (x + 5)^{-3} - \log_a (x - 2)^2$ D) $4 \log_a x - 3 \log_a (x + 5) - 2 \log_a (x - 2)$

Answer: A

Objective: (4.3) Expand Logarithmic Expressions

ALVAREZ--VIDEO 66 S79-59,60

Solve the equation by expressing each side as a power of the same base and then equating exponents.

21) $4^{x + 10} = 8^{x - 2}$ 21) _____

A) {22} B) {26} C) {16} D) {12}

Answer: B

Objective: (4.4) Use Like Bases to Solve Exponential Equations

ALVAREZ--VIDEO 70 S79-39

Solve the logarithmic equation. Be sure to reject any value that is not in the domain of the original logarithmic expressions. Give the exact answer.

22) $\log_3 (x + 4) = 1$ 22) _____

A) {-3} B) {5} C) {-1} D) {7}

Answer: C

Objective: (4.4) Use the Definition of a Logarithm to Solve Logarithmic Equations

ALVAREZ-- VIDEO 75 S79-48

23) $\log x + \log (x - 1) = \log 12$ 23) _____

A) {4, −3} B) {−3} C) $\left\{\frac{13}{2}\right\}$ D) {4}

Answer: D

Objective: (4.4) Use the One-to-One Property of Logarithms to Solve Logarithmic Equations

ALVAERZ--VIDEO 80 S79-64

Solve the problem.

24) Find out how long it takes a $2500 investment to double if it is invested at 8% compounded quarterly. Round to the nearest tenth of a year. Use the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$. 24) _____

A) 9 years B) 9.2 years C) 8.6 years D) 8.8 years

Answer: D

Objective: (4.4) Solve Applied Problems Involving Exponential and Logarithmic Equations

ALVAREZ VIDEO 81 S79-70

25) The population of a certain country is growing at a rate of 2.5% per year. How long will it take for this country's population to double? Use the formula $t = \frac{\ln 2}{k}$, which gives the time, t, for a population with growth rate k, to double. (Round to the nearest whole year.) 25) _____

A) 28 years B) 27 years C) 29 years D) 30 years

Answer: A

Objective: (4.4) Solve Applied Problems Involving Exponential and Logarithmic Equations

ALVAREZ--VIDEO 84 S79-70

Solve the system of equations.

26) $x + y + z = -6$
$x - y + 3z = 2$
$3x + y + z = -14$ 26) _____

A) {(−3, −4, 1)} B) {(−4, −3, 1)} C) {(1, −3, −4)} D) {(1, −4, −3)}

Answer: B

Objective: (5.2) Solve Systems of Linear Equations in Three Variables

ALVAREZ-VIDEO 89 S79-77

Use Cramer's rule to solve the system.

27) $2x + 3y = -4$
$5x + y = -23$ 27) _____

A) {(−5, 2)} B) {(2, −5)} C) {(−2, −5)} D) {(−5, −2)}

Answer: A

Objective: (6.5) Solve a System of Linear Equations in Two Variables Using Cramer's Rule

AlVAREZ VIDEO 96 S79-76

Find the indicated sum.

28) $\sum_{i=3}^{5} (i^2 + 2)$ 28) _____

A) 30 B) 56 C) 65 D) 18

Answer: B

Objective: (8.1) Use Summation Notation

ALVAREZ--VIDEO 98 S79–78

Use the Binomial Theorem to expand the binomial and express the result in simplified form.

29) $(2x + 3)^3$ 29) _____

A) $4x^6 + 6x^3 + 729$ B) $8x^3 + 36x^2 + 36x + 27$

C) $8x^3 + 36x^2 + 54x + 27$ D) $4x^2 + 12x + 9$

Answer: C

Objective: (8.5) Expand a Binomial Raised to a Power

ALVAREZ--VIDEO 99 S79–79

1. Part 1 — Solve by factoring

$12x^2 + 31x + 20 = 0$

Possibilities: 12·1, 6·2, 3·4 | 20·1, 10·2, 4·5

$(3x + 4)(4x + 5) = 0$

$3x + 4 = 0$ OR $4x + 5 = 0$

$3x + 4 - 4 = 0 - 4$ OR $4x + 5 - 5 = 0 - 5$

$3x = -4$ OR $4x = -5$

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

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

1. Part 2 — Solve using Quadratic formula

$12x^2 + 31x + 20 = 0$

$a = 12,\ b = 31,\ c = 20$

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

$$x = \frac{-(31) \pm \sqrt{(31)^2 - 4(12)(20)}}{2(12)}$$

$$x = \frac{-31 \pm \sqrt{961 - 960}}{24}$$

$$x = \frac{-31 \pm \sqrt{1}}{24}$$

$x = \frac{-31-1}{24}$ or $x = \frac{-31+1}{24}$

$x = \frac{-32}{24}$ OR $x = \frac{-30}{24}$

$x = \frac{\cancel{8}(-4)}{\cancel{8}(3)}$ or $x = \frac{\cancel{6}(-5)}{\cancel{6}(4)}$

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

(2) $\sqrt{22x+11} = x+6$

$(\sqrt{22x+11})^2 = (x+6)^2$

$22x+11 = (x+6)(x+6)$

$22x+11 = x^2+6x+6x+36$

$22x+11 = x^2+12x+36$

$0 = x^2+12x+36-22x-11$

$0 = x^2-10x+25$

$0 = (x-5)(x-5)$

Let $x-5=0$ OR $x-5=0$

$x-5+5 = 0+5$ OR $x-5+5 = 0+5$

$x=5$ OR $x=5$

Check

$\sqrt{22x+11} = x+6$

$\sqrt{22(5)+11} = (5)+6$

$\sqrt{110+11} = 5+6$

$\sqrt{121} = 11$

$11 = 11$

Good

answer

$x=5$

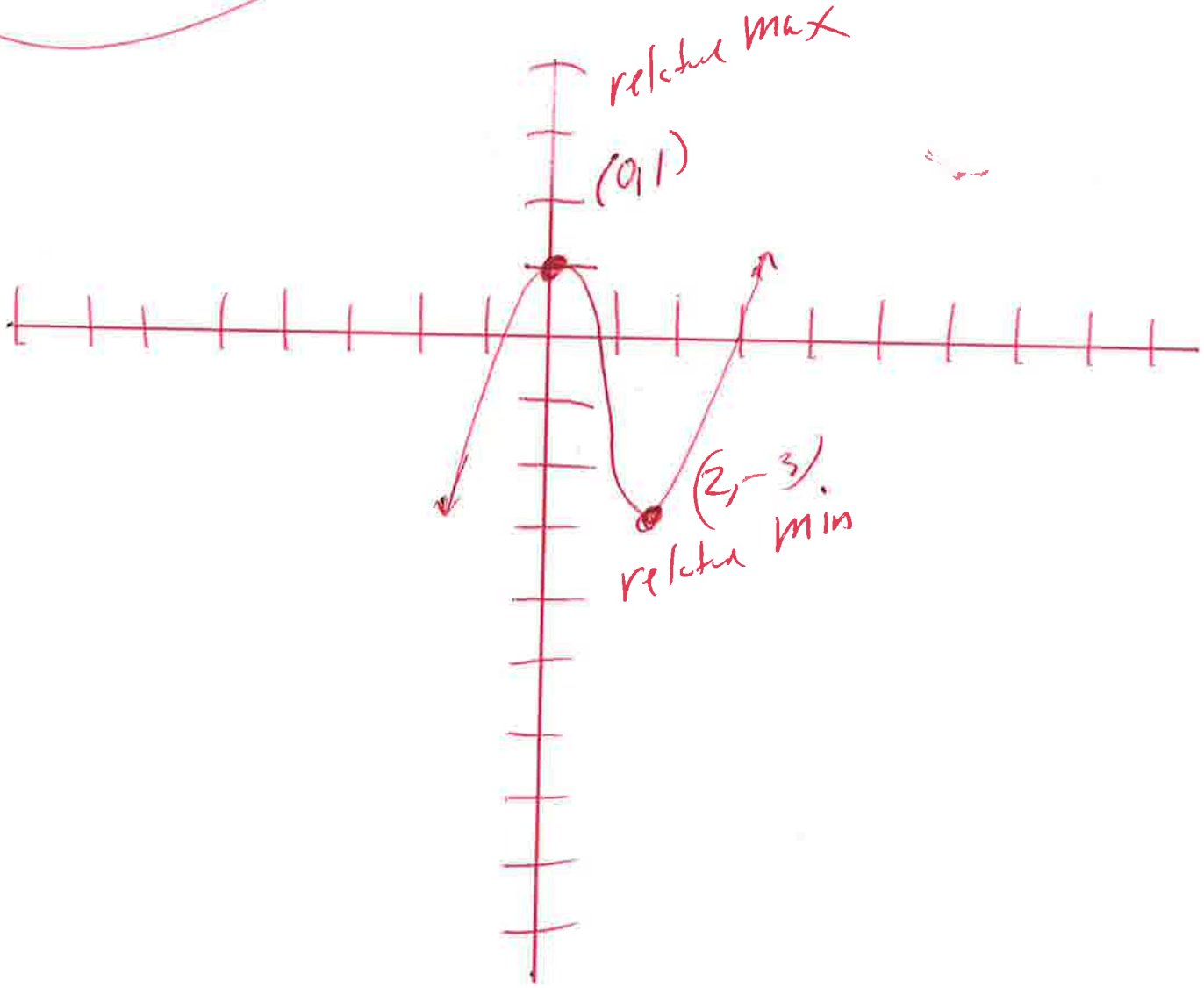
(3) $f(x) = x^3 - 3x^2 + 1$

Find the relative max and relative min

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

Use graphing calculator

$y_1 = x^3 - 3x^2 + 1$



(4) Graph

$$f(x) = \begin{cases} x+1 & \text{if } x < 1 \\ -5 & \text{if } x \geq 1 \end{cases}$$

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

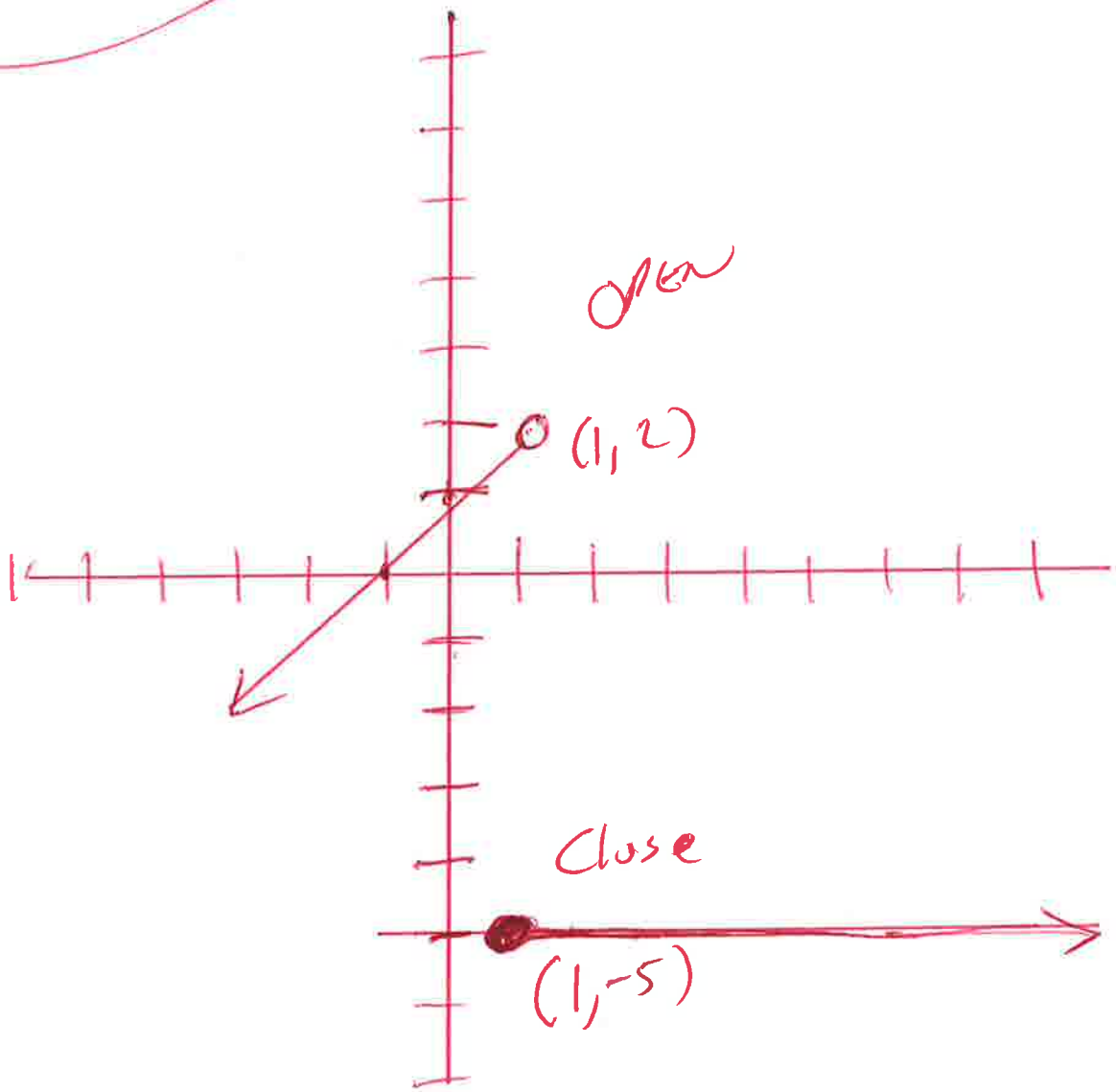
Use graphing calculator

2nd Math

$y_1 = x+1 \div (x < 1)$ Open Circle

2nd Math

$y_2 = -5 \div (x \geq 1)$ Close Circle



⑤ $f(x) = x^2 + 9x - 2$

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

$$\frac{((x+h)^2 + 9(x+h) - 2) - (x^2 + 9x - 2)}{h} =$$

$$\frac{(x+h)(x+h) + 9x + 9h - 2 - x^2 - 9x + 2}{h} =$$

$$\frac{x^2 + xh + xh + h^2 + 9x + 9h - 2 - x^2 - 9x + 2}{h} =$$

$$\frac{x^2 + 2xh + h^2 + 9x + 9h - 2 - x^2 - 9x + 2}{h} =$$

$$\frac{2xh + h^2 + 9h}{h} =$$

$$\frac{2xh}{h} + \frac{h^2}{h} + \frac{9h}{h} =$$

$$2x + h + 9 =$$

(6) graph

$h(x) = |x - 5| - 5$

shift right 5

shift down −5

Use graphing Calculator

window

x-min = −12

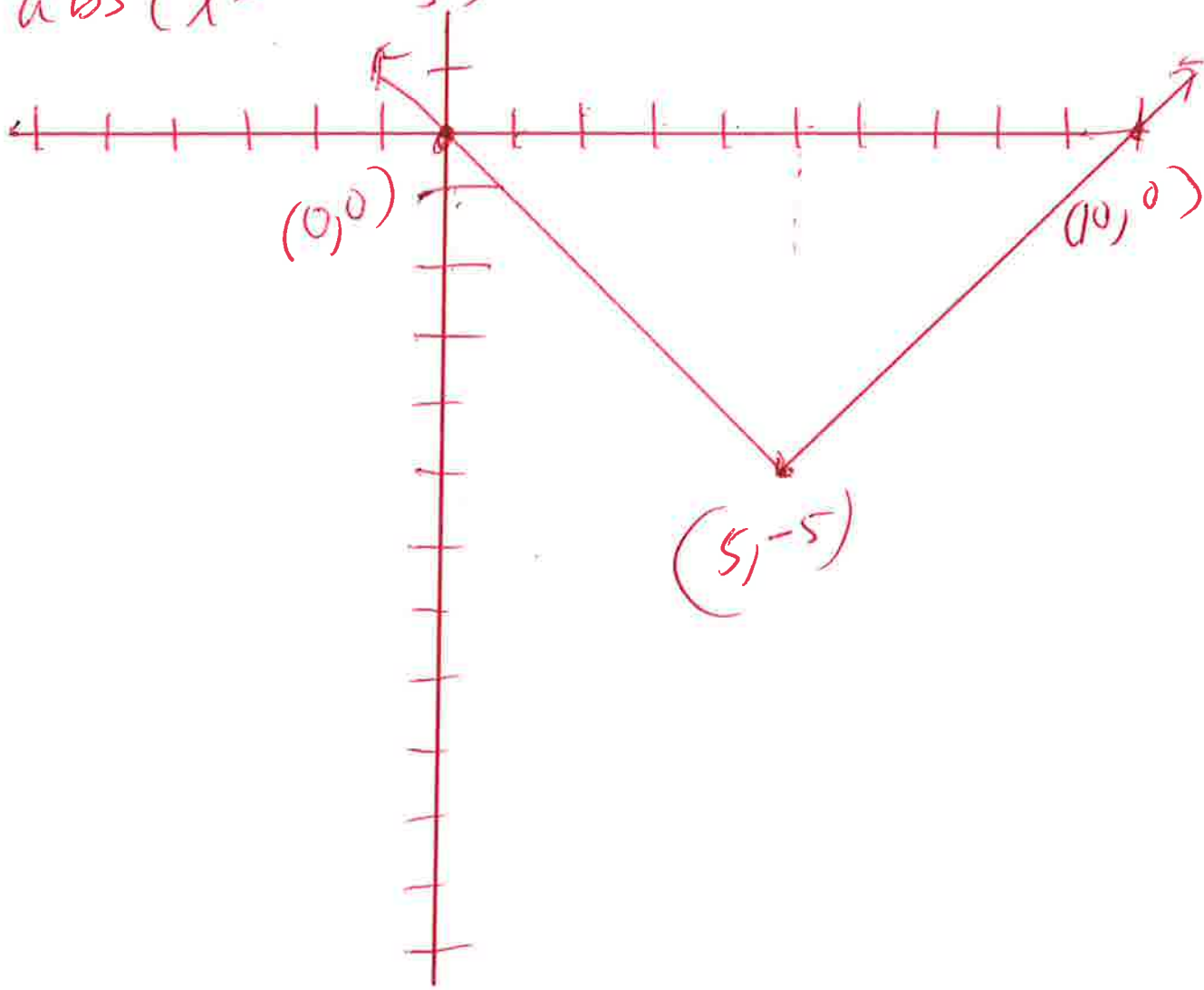
x-max = 12

y-min = −10

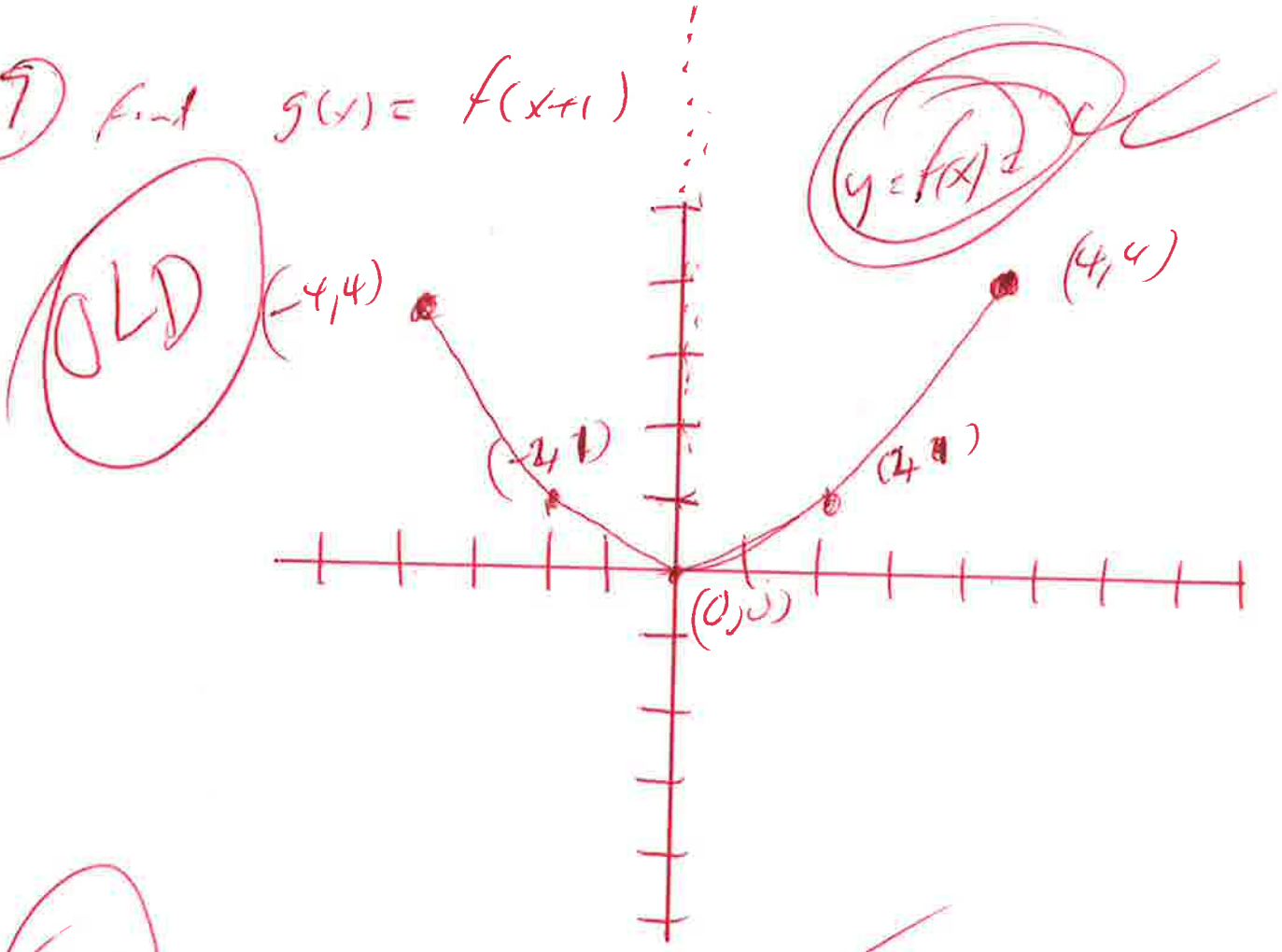
y-max = 10

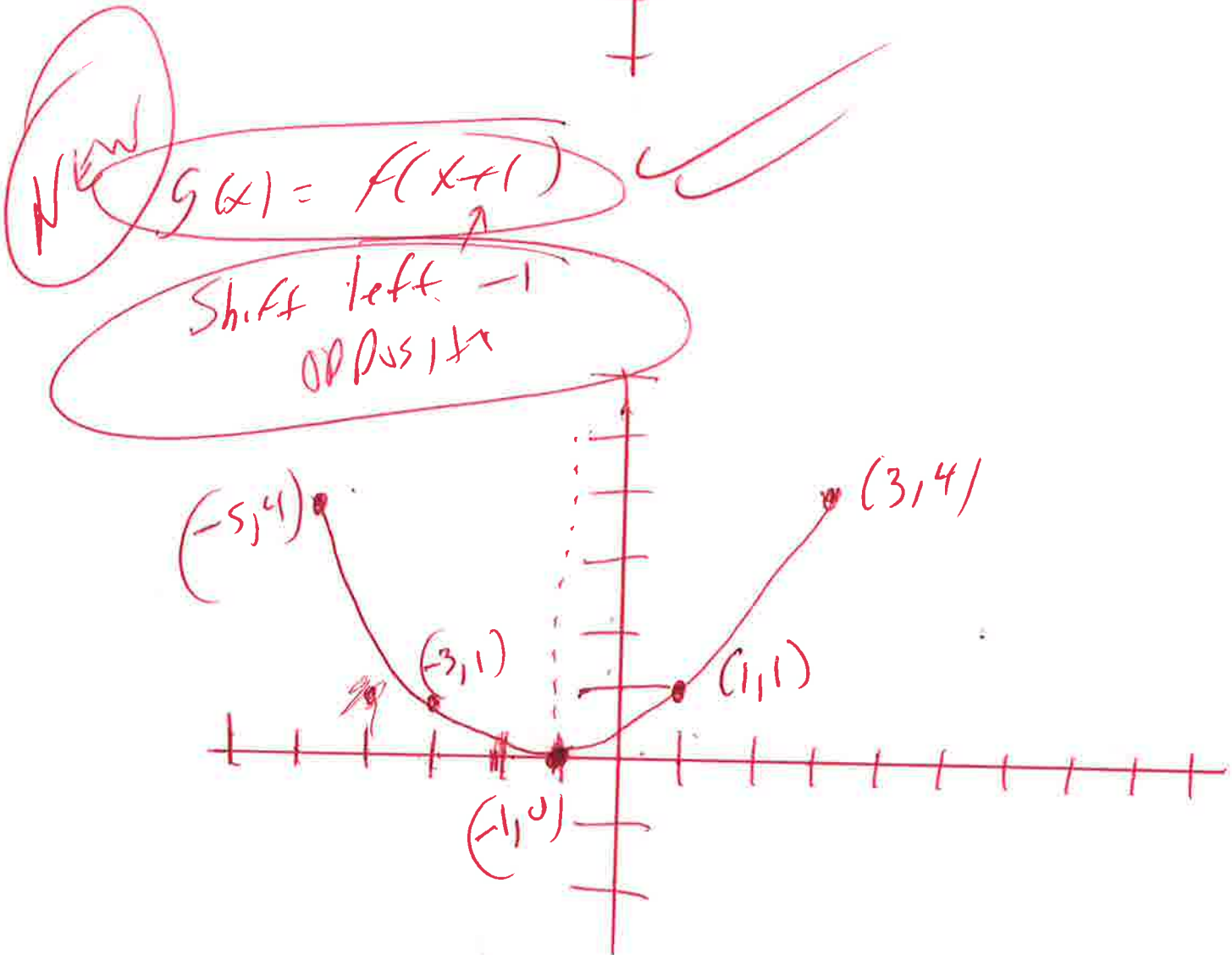
$y_1 =$ Math, Num, abs, enter

$y_1 = abs(x - 5) - 5$ (BIG — BIG)



7) Find $g(x) = f(x+1)$


OLD
$y = f(x)$
(-4,4)
(4,4)
(-2,1)
(2,1)
(0,0)


NEW
$g(x) = f(x+1)$
Shift left −1
OPPOSITE
(-5,4)
(3,4)
(-3,1)
(1,1)
(-1,0)

8. find the domain

$f(x) = \sqrt{24 - x}$

formula

domain

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

Let $Ax + B \geq 0$

Let $24 - x \geq 0$

$24 - x - 24 \geq 0 - 24$

$-x \geq -24$

$\frac{-x}{-1} \leq \frac{-24}{-1}$ divide by a negative and turn all signs around

$x \leq 24$

$(-\infty, 24]$

(9) $f(x) = 9x - 2$ and $g(x) = 4x - 7$

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

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

$(9x - 2) - (4x - 7) =$

$9x - 2 - 4x + 7 =$

$5x + 5 =$

formula

$(f - g)(x) =$

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

(10.) $f(x) = 3x + 14$ and $g(x) = 2x - 1$

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

$f(g(x)) =$

$f(2x-1) =$

$3(2x-1)+14 =$

$6x - 3 + 14 =$

$6x + 11 =$

(11.) find the inverse of the one-to-one function

$$f(x) = \frac{8}{3x+7}$$

$$y = \frac{8}{3x+7}$$ set $y =$

$$x = \frac{8}{3y+7}$$ inverse variables

$$\frac{x}{1} = \frac{8}{3y+7}$$

$x(3y+7) = 1(8)$ cross mult

$3xy + 7x = 8$

$3xy + 7x - 7x = 8 - 7x$

$3xy = 8 - 7x$

$$\frac{3xy}{3x} = \frac{8-7x}{3x}$$

$$y = \frac{8-7x}{3x}$$

$$y = \frac{8}{3x} - \frac{7x}{3x}$$

$$y = \frac{8}{3x} - \frac{7}{3}$$

inverse function

$$f^{-1}(x) = \frac{8}{3x} - \frac{7}{3}$$

(12) graph

$f(x) = 2(x+6)^2 + 1$

Windows

X-min = -12

X-max = 12

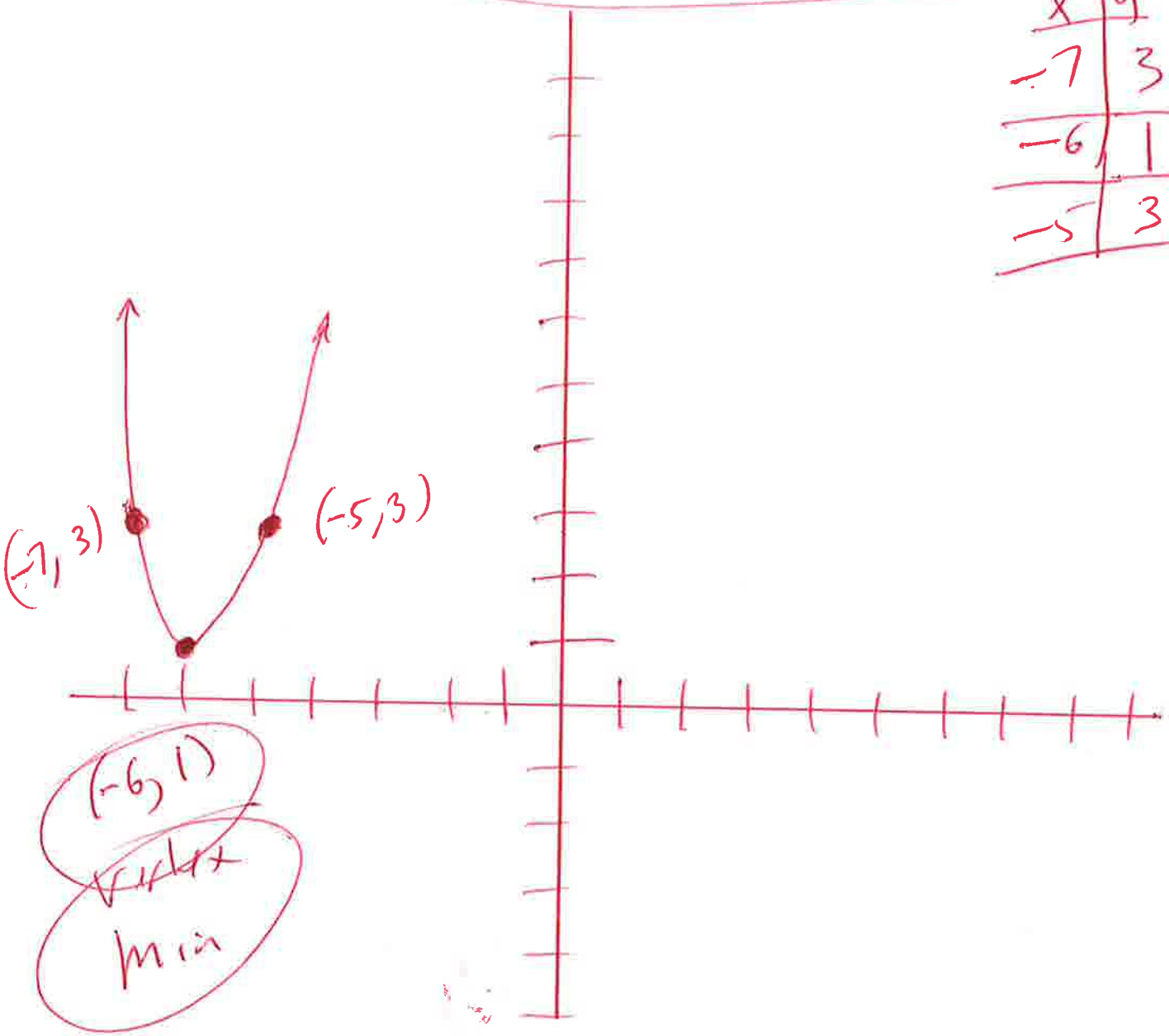
y-min = -10

y-max = 10

Use graphing calculator

$y_1 = 2(x+6)^2 + 1$

x	y
-7	3
-6	1
-5	3



(-6, 1)

vertex

min

(13) Graph

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

Windows

x-min = -12

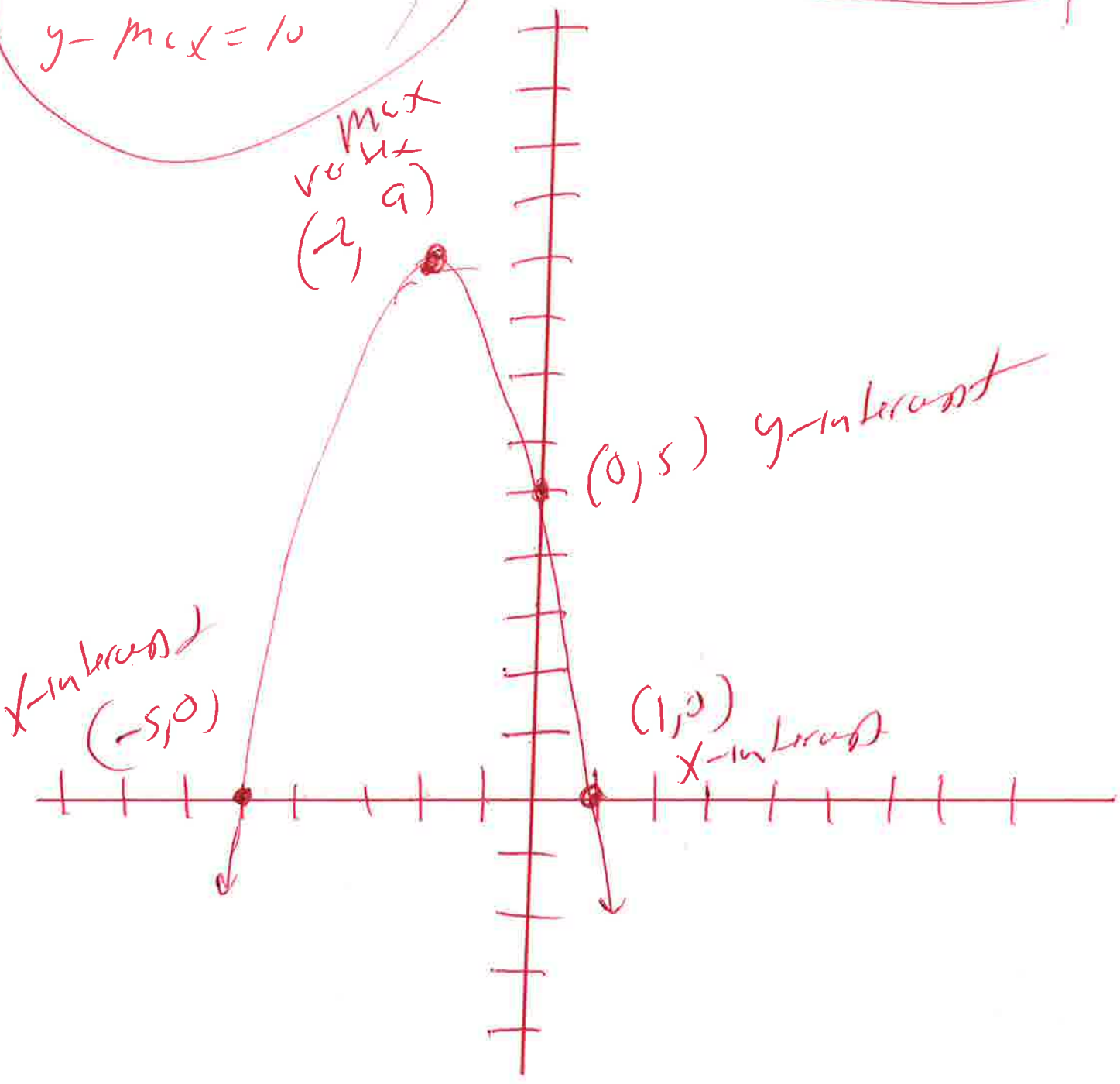
x-max = 12

y-min = -10

y-max = 10

Use Graphing Calculator

$y_1 = -x^2 - 4x + 5$ (with BIG)



(14) find Max

$h(x) = -16x^2 + 160x$

$a = -16, \quad b = 160, \quad c = 0$

$Max = Vertex = \left(-\frac{b}{2a}, f\left(\frac{b}{2a}\right)\right)$

$Vertex = \left(-\frac{(160)}{2(-16)}, f\left(\frac{(160)}{2(-16)}\right)\right)$

$Vertex = \left(\frac{-160}{-32}, f\left(\frac{160}{-32}\right)\right)$

$Vertex = (5, f(5))$

$Vertex = (5, -16(5)^2 + 160(5))$

$Vertex = (5, -16(5)(5) + 160(5))$

$Vertex = (5, -16(25) + 160(5))$

$Vertex = (5, -400 + 800)$

$Vertex = (5, 400)$

Max

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

$1x^3 + 5x^2 - x - 5 = 0$

use synthetic division

try $x = 1$

1	1	5	−1	−5
		1	6	5
	1	6	5	0 rem

$x^2 + 6x + 5 = 0$

$(x + 1)(x + 5) = 0$

so $x + 1 = 0$ OR $x + 5 = 0$

$x + 1 - 1 = 0 - 1$ OR $x + 5 - 5 = 0 - 5$

$x = -1$ OR $x = -5$

answers

$1, -1, -5$

Poss. by
Last
first

$\frac{\pm 5}{\pm 1}$

$\frac{\pm 5}{1}, \frac{\pm 1}{1}$

$\pm 5, \pm 1$

(16) Find the vertical asymptotes

$$\frac{x-81}{x^2-15x+56}$$

Bottom only

$x^2-15x+56=0$

$(x-7)(x-8)=0$

$x-7=0$ or $x-8=0$

$x-7+7=0+7$ or $x-8+8=0+8$

$x=7$ or $x=8$

Vertical asymptote.

$x=7$ or $x=8$

(17) Find the horizontal asymptote

$$g(x) = \frac{4x^2 - 7x - 5}{7x^2 - 3x + 7}$$

$$\lim_{x \to \infty} \frac{4x^2 - 7x - 5}{7x^2 - 3x + 7} =$$

$$\lim_{x \to \infty} \left(\frac{4x^2 - 7x - 5}{7x^2 - 3x + 7} \right) \left(\frac{\frac{1}{x^2}}{\frac{1}{x^2}} \right) \text{ multiply}$$

$$\lim_{x \to \infty} \frac{\frac{4x^2}{x^2} - \frac{7x}{x^2} - \frac{5}{x^2}}{\frac{7x^2}{x^2} - \frac{3x}{x^2} + \frac{7}{x^2}} =$$

$$\lim_{x \to \infty} \frac{4 - \frac{7}{x} - \frac{5}{x^2}}{7 - \frac{3}{x} + \frac{7}{x^2}} =$$

$$\frac{4 - 0 - 0}{7 - 0 + 0} =$$

$$\frac{4}{7}$$

Horizontal asymptote

$$y = \frac{4}{7}$$

(18) Find the slant asymptote

$$f(x) = \frac{x^2 + 3x - 8}{x - 4}$$

$$\frac{x^2 + 3x - 8}{x - 4}$$ use synthetic division

OPP

4	1	3	−8
		4	28
	1	7	20 ← Rem

$y = x + 7$

SLANT asymptote only

formula
domain
$f(x) = \ln(Ax+B)$
so $Ax+B > 0$

(19) find the domain

$f(x) = \ln(6-x)$

so $6-x > 0$

$6-x-6 > 0-6$

$-x > -6$

$\frac{-x}{-1} < \frac{-6}{-1}$ divide by a negative and turn all signs around

$x < 6$

$(-\infty, 6)$

(20) expand

$$\log_a\left(\frac{x^4\sqrt[3]{x+5}}{(x-2)^2}\right) =$$

$$\log_a\left(x^4\sqrt[3]{x+5}\right) - \log_a(x-2)^2 =$$

$$\log_a(x^4) + \log_a\sqrt[3]{x+5} - \log_a(x-2)^2 =$$

$$\log_a(x^4) + \log_a(x+5)^{\frac{1}{3}} - \log_a(x-2)^2 =$$

$$4\log_a(x) + \frac{1}{3}\log_a(x+5) - 2\log_a(x-2) =$$

formula

$$\log_a\left(\frac{A}{B}\right) = \log_a(A) - \log_a(B)$$

$$\log_a(A\cdot B) = \log_a(A) + \log_a(B)$$

$$\log_a(A^N) = N\log_a(A)$$

(21) $4^{x+10} = 8^{x-2}$

$(2^2)^{x+10} = (2^3)^{x-2}$ rewrite

$2^{2x+20} = 2^{3x-6}$

$2x+20 = 3x-6$

$2x+20-20 = 3x-6-20$

$2x = 3x-26$

$2x-3x = 3x-26-3x$

$-1x = -26$

$\frac{-1x}{-1} = \frac{-26}{-1}$

$x = 26$

Solve

(22) $\log_3(x+4) = 1$

$\log_3(x+4) = 1$ rewrite

$3^1 = x+4$

$3 = x+4$

$3-4 = x+4-4$

$-1 = x$

Check

$\log_3(x+4) = 1$

$\log_3(-1+4) = 1$

$\log_3(3) = 1$

Good

Answer

$x = -1$

(23) $\log(x) + \log(x-1) = \log(12)$

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

$x(x-1) = 12$

$x^2 - x = 12$

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

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

so $x+3=0$ or $x-4=0$

$x+3-3=0-3$ or $x-4+4=0+4$

~~$x=-3$~~ or $x=4$

Check

$\log(x) + \log(x-1) = \log(12)$

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

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

BAD BAD

Possible

12, 1

6, 2

3, 4

formula

$\log(A) + \log(B) =$

$\log(AB) =$

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

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

Good Good Good

answer

$x = 4$

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

$A = 5000$

$P = 2500$

$r = 8\% = .08$

$N = 4$

$t = ??$

$5000 = 2500\left(1 + \frac{.08}{4}\right)^{4t}$

$5000 = 2500\left(1 + .02\right)^{4t}$

$5000 = 2500\left(1.02\right)^{4t}$

$\frac{5000}{2500} = \frac{2500\,(1.02)^{4t}}{2500}$

$2 = (1.02)^{4t}$

$\ln(2) = \ln(1.02)^{4t}$

$\ln(2) = 4t \ln(1.02)$

$\frac{\ln(2)}{(4\ln(1.02))} = \frac{4t\ln(1.02)}{(4\ln(1.02))}$

$8.75069715 = t$

OR

$8.8 = t$

Round

(25) $A = Pe^{rt}$

double $A = 200$

$P = 100$

$r = 2.5\% = .025$

$t = ??$

$200 = 100e^{.025t}$

$\frac{200}{100} = \frac{100e^{.025t}}{100}$

$2 = e^{.025t}$

$\ln(2) = \ln(e^{.025t})$

$\ln(2) = .025t \ln(e)$

$\ln(2) = .025t(1)$

$\ln(2) = .025t$

$\frac{\ln(2)}{.025} = \frac{.025t}{.025}$

$27.72588722 = t$

or

$28 = t$

Round

formula

$\ln(A^N) = N\ln(A)$

$\ln(e) = 1$

(26) $x+y+z=-6$

$x-y+3z=2$

$3x+y+z=-14$

Use graphing calculator

2ND, matrix, Edit, [A], 3x4, enter

$$[A]=\begin{bmatrix}1 & 1 & 1 & -6\\ 1 & -1 & 3 & 2\\ 3 & 1 & 1 & -14\end{bmatrix}$$

2ND, matrix, Math, rref( ), enter

$$rref([A])=\begin{bmatrix}1 & 0 & 0 & -4\\ 0 & 1 & 0 & -3\\ 0 & 0 & 1 & 1\end{bmatrix}\begin{matrix}x\\ y\\ z\end{matrix}$$

$(x, y, z) = (-4, -3, 1)$

(27) Use Cramers rule

$2x+3y=-4$

$5x+y=-23$

$$x=\frac{\begin{vmatrix}-4 & 3\\ -23 & 1\end{vmatrix}}{\begin{vmatrix}2 & 3\\ 5 & 1\end{vmatrix}}=-5 \qquad y=\frac{\begin{vmatrix}2 & -4\\ 5 & -23\end{vmatrix}}{\begin{vmatrix}2 & 3\\ 5 & 1\end{vmatrix}}=2$$

$(x,y)=(-5,2)$

Use a graphing calculator

OR

$2x+3y=-4$

$5x+y=-23$

$\begin{pmatrix}2x+3y=-4\\ 5x+y=-23\end{pmatrix}\begin{pmatrix}-1\\ 3\end{pmatrix}$ Mult

$-2x-3y=4$

$15x+3y=-69$

$13x+0=-65$

$13x=-65$

$\frac{13x}{13}=\frac{-65}{13}$

$x=-5$

Subs x

$2x+3y=-4$

$2(-5)+3y=-4$

$-10+3y=-4$

$-10+3y+10=-4+10$

$3y=6$

$\frac{3y}{3}=\frac{6}{3}$

$y=2$

$(x,y)=(-5,2)$

(28) $\sum_{x=3}^{5} (x^2+2)$

$(3)^2+2) + ((4)^2+2) + ((5)^2+2) =$

$((3)(3)+2) + ((4)(4)+2) + ((5)(5)+2) =$

$(9+2) + (16+2) + (25+2) =$

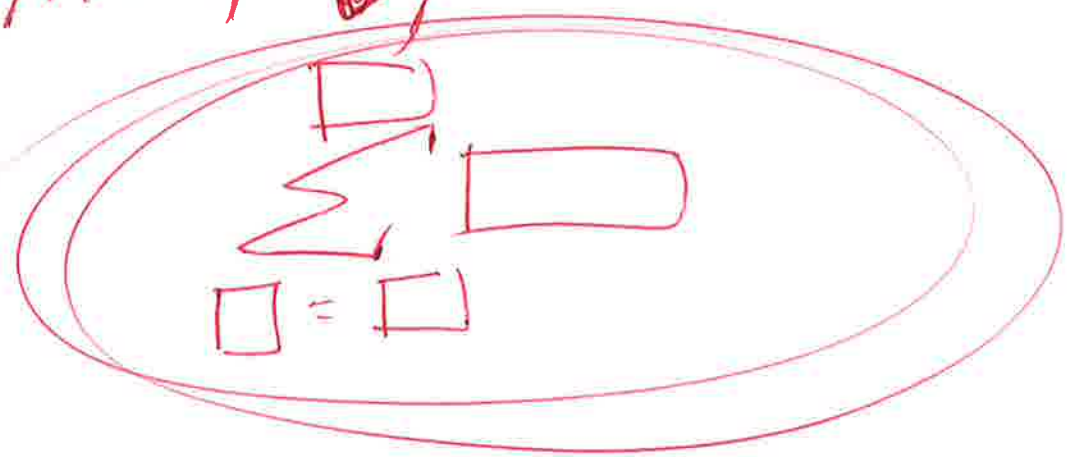
$(11) + (18) + (27) =$

$11 + 18 + 27 =$

$56 =$

OR use graphy calculator

Math ↓ Summation Σ



(29) Use binomial theorem

$(2x+3)^3$

$\binom{3}{0}(2x)^3(3)^0 + \binom{3}{1}(2x)^2(3)^1 + \binom{3}{2}(2x)^1(3)^2 + \binom{3}{3}(2x)^0(3)^3 =$

$(1)(2^3x^3)(1) + (3)(2^2x^2)(3) + (3)(2^1x^1)(9) + (1)(1)(27) =$

$(1)(8x^3)(1) + (3)(4x^2)(3) + (3)(2x)(9) + (1)(1)(27) =$

$8x^3 + 36x^2 + 54x + 27 =$

Use a graphing calculator

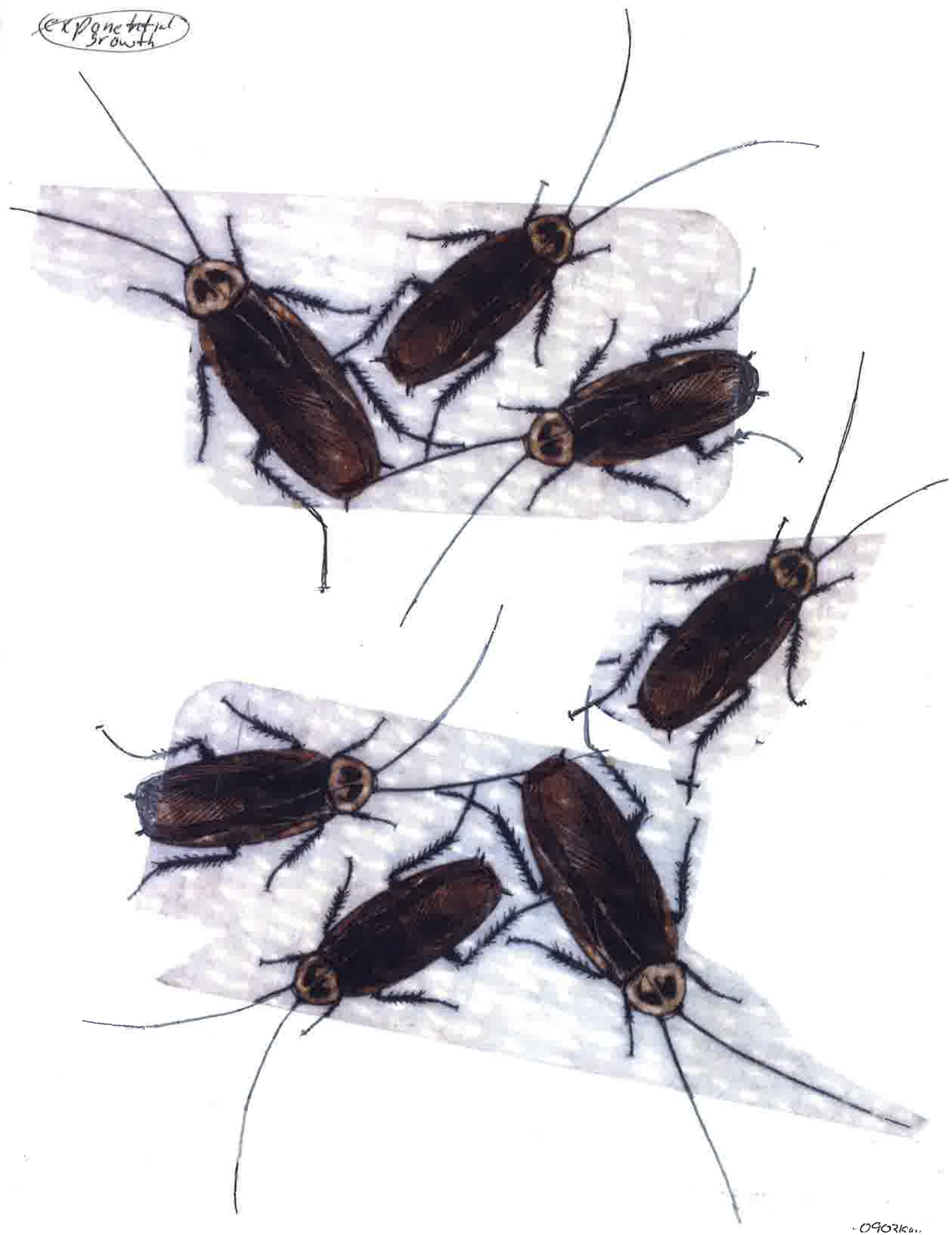
3, Math, Prb, nCr, enter, 0, enter = 1

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

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

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

MATH IS FUN


exponential growth

exponential growth