Algebra II
Turkey Review

Gobble – Gobble KEY
Date ____________________

1.) Our school wanted to order new t-shirts for spirit wear with the new logo but was having trouble choosing a company to place their order with. One company, Bruell's Beauty, charges \$9.65 per shirt plus a setup fee of \$43. Another company, Shadel's Suave, charges \$8.40 per shirt plus a \$58 fee.

A.) Write an equation that represents each company. Let C stand for cost and s stand for number of t-shirts.

Bruell's Beauty

$C = 9.65s + 43$

Shadel's Suave

$C = 8.40s + 58$

B.) For what number of shirts would the cost be the same?

$9.65s + 43 = 8.40s + 58$

$1.25s + 43 = 58$

$1.25s = 15$

$s = 12$

FOR 12 SHIRTS

C.) Which company would be better to use if your school was planning on purchasing 200 t-shirts? Explain.

BRUELL'S

$C = 9.65(200) + 43$

$C = \$1973$

SHADEL'S

$C = 8.40(200) + 58$

$C = \$1738$

SHADEL'S SUAVE WOULD GIVE YOU A BETTER DEAL. YOU WOULD SAVE \$235 IF YOU WENT WITH SHADEL.

2.) If $g(x) = 2x^2 - 3x + 5$, find $g(2a - 1)$

$g(2A-1) = 2(2A-1)^2 - 3(2A-1) + 5$

$= 2(2A-1)(2A-1) - 3(2A-1) + 5$

$= 2(4A^2 - 2A - 2A + 1) - 3(2A-1) + 5$

$= 2(4A^2 - 4A + 1) - 3(2A-1) + 5$

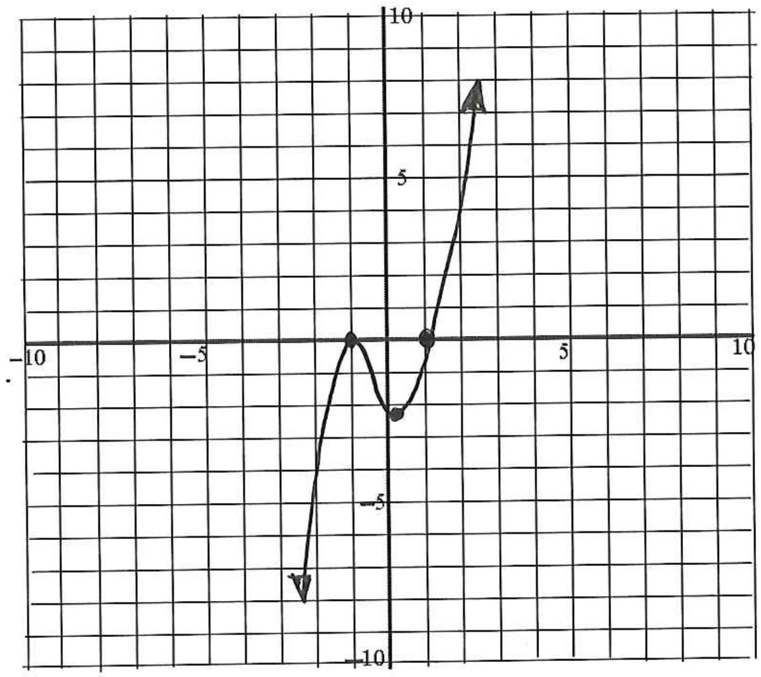
$= 8A^2 - 8A + 2 - 6A + 3 + 5$

$\boxed{= 8A^2 - 14A + 10}$

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

$(x^5 + 2x^2) + (-x - 2)$

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



Degree: 5

End Behavior:

AS $x \to \infty$, $f(x) \to \infty$

AS $x \to -\infty$, $f(x) \to -\infty$

Zeros: $-1, 1$

R. Max: $(-1, 0)$

R. Min: $(0.25, -2.12)$

Intervals Increasing: $(-\infty, -1) \cup (0.25, \infty)$

Intervals Decreasing: $(-1, 0.25)$

4.) Simplify:

A.) $(5m - 4n)^2$

$(5M - 4N)(5M - 4N)$

$25M^2 - 20MN - 20MN + 16N^2$

$\boxed{25M^2 - 40MN + 16N^2}$

B.) $(4x^3 - 6x^2 + 7) - (15 - 2x^3 + 6x^2 + 4x)$

$4x^3 - 6x^2 + 7 - 15 + 2x^3 - 6x^2 - 4x$

$\boxed{6x^3 - 12x^2 - 4x - 8}$

5.) Solve the following system of equations:

$x - y + 3z = -8$

$2y - z = 15 \longrightarrow z = 2y - 15$

$3x + 2z = -7$

$x - y + 3(2y - 15) = -8$

$x - y + 6y - 45 = -8$

$x + 5y = 37$

$3x + 2(2y - 15) = -7$

$3x + 4y - 30 = -7$

$3x + 4y = 23$

$x + 5y = 37 \, (-3) \to -3x - 15y = -111$

$3x + 4y = 23 \longrightarrow 3x + 4y = 23$

$-11y = -88$

$y = 8$

$z = 2(8) - 15$

$z = 16 - 15$

$z = 1$

$3x + 4(8) = 23$

$3x + 32 = 23$

$3x = -9$

$x = -3$

$\boxed{(-3, 8, 1)}$

6.) Chad decides to try out for the USA Olympic Super Trampoline Team. In order for Chad to make the team he must perform a Quadruple Double Tuck Backward McShaky Side Shimmy jump in 5.8 seconds after leaving the trampoline (a feat that only one other person can perform, yours truly, Mr. Falinski). Chad knows he will have to launch himself at 19.6 meters per second (m/s) from the trampoline. Alex, his equation manager, who is a sleep 90% of the time, calculates that the height s at time t seconds after his launch is modeled by the equation $s(t) = -4.2t^2 + 24.6t + 2.2$, where s is in meters.

A.) What was the initial height that Chad began his ridiculously awesome Shimmy from?

- $s(0) = -4.2(0)^2 + 24.6(0) + 2.2$
- $s(0) = \boxed{2.2 \text{ METERS}}$

B.) When will Chad reach the peak of his Shimmy?

- $t = \dfrac{-24.6}{2(-4.2)} = \dfrac{-24.6}{-8.4} = \boxed{2.93 \text{ SECONDS}}$

C.) What will be the peak of Chad's Quadruple Double Tuck Backward McShaky Side Shimmy?

- $s(2.93) = -4.2(2.93)^2 + 24.6(2.93) + 2.2$
- $s(2.93) = \boxed{38.2 \text{ METERS}}$

D.) When will Chad land his Shimmy?

- $0 = -4.2t^2 + 24.6t + 2.2$
- $x = \dfrac{-24.6 \pm \sqrt{(24.6)^2 - 4(-4.2)(2.2)}}{2(-4.2)}$
- $x = \dfrac{-24.6 \pm \sqrt{642.12}}{-8.4}$
- $x = -0.09$ $\quad \boxed{x = 5.95 \text{ SECONDS}}$

E.) Will it be in enough time to make the team? Explain in full sentences

- NO - CHAD MISSES THE CUT BY 0.15 SECONDS :(

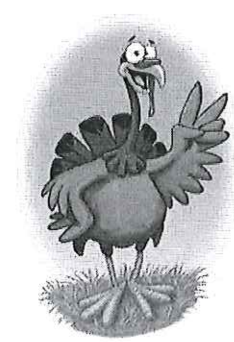
F.) When will Chad reach 22 meters in his Quadruple Double Tuck Backward McShaky Side Shimmy?

- $22 = -4.2t^2 + 24.6t + 2.2$
- $0 = -4.2t^2 + 24.6t - 19.8$
- $x = \dfrac{-24.6 \pm \sqrt{(24.6)^2 - 4(-4.2)(-19.8)}}{2(-4.2)}$
- $x = \dfrac{-24.6 \pm \sqrt{272.52}}{-8.4}$
- $\boxed{x = 0.96 \text{ sec}}$ $\quad \boxed{x = 4.89 \text{ SECONDS}}$

7.) Find the remainder when $z^5 - 3z^2 - 20$ is divided by $z - 2$.

$$\begin{array}{r|rrrrrr} 2 & 1 & 0 & 0 & -3 & 0 & -20 \\ & \downarrow & 2 & 4 & 8 & 10 & 20 \\ \hline & 1 & 2 & 4 & 5 & 10 & 0 \end{array}$$

$\boxed{\text{REMAINDER IS } 0}$



8.) Find k so that -3 is a root of $2x^2 + kx - 27 = 0$.

$$\begin{array}{r|rrr} -3 & 2 & k & -27 \\ & \downarrow & -6 & -3(k-6) \\ \hline & 2 & (k-6) & 0 \end{array}$$

- $-3(k-6) - 27 = 0$
- $-3(k-6) = 27$
- $(k-6) = -9$
- $\boxed{k = -3}$

9.) Solve Algebraically and Graphically.

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

A.) Algebraically

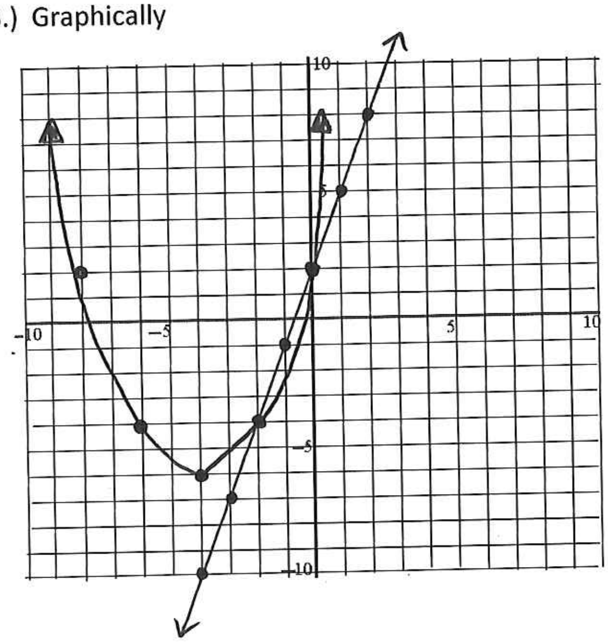
- $3x + 2 = \frac{1}{2}(x+4)^2 - 6$
- $3x + 2 = \frac{1}{2}(x^2 + 8x + 16) - 6$
- $3x + 2 = \frac{1}{2}x^2 + 4x + 8 - 6$
- $3x + 2 = \frac{1}{2}x^2 + 4x + 2$
- $0 = \frac{1}{2}x^2 + x$
- $0 = x(\frac{1}{2}x + 1)$
- $x = 0$ $\frac{1}{2}x + 1 = 0$
  $\frac{1}{2}x = -1$
  $x = -2$

$y = 3(0) + 2$
$y = 2$

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

Solution(s): $(0, 2), (-2, -4)$

B.) Graphically



Solution(s): $(-2, -4), (0, 2)$

10.) Find all zeros given $x = 2$ is a zero to the following equation: $x^3 - 4x^2 + 6x - 4 = 0$

$$\begin{array}{r|rrrr} 2 & 1 & -4 & 6 & -4 \\ & \downarrow & 2 & -4 & 4 \\ \hline & 1 & -2 & 2 & 0 \end{array}$$

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

$(\frac{-2}{2})^2$

- $x^2 - 2x + \underline{1} = -2 + \underline{1}$

$(-1)^2$

1

- $(x-1)^2 = -1$
- $x - 1 = \pm i$
- $x = 1 \pm i$

Zeros: $2, 1+i, 1-i$

11.) Find $f(2x-3)$ for the following function:

$f(x) = -3x^2 + 4x - 8$

$f(2x-3) = -3(2x-3)^2 + 4(2x-3) - 8$

$= -3(4x^2 - 12x + 9) + 4(2x-3) - 8$

$= -12x^2 + 36x - 27 + 8x - 12 - 8$

$\boxed{= -12x^2 + 44x - 47}$

12.) Multiply: $(7-5i)(7+5i)(2-3i)$

$(49 + 35i - 35i - 25i^2)(2-3i)$

$(49 - 25(-1))(2-3i)$

$74(2-3i)$

$\boxed{148 - 222i}$

Find all of the rational zeros for each function.

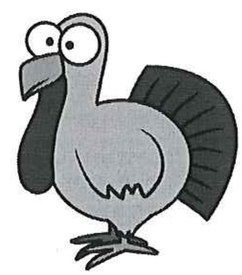
13.) $f(x) = x^4 - x^3 + x^2 - 3x - 6$

\+ + + + −

\# of Zeros: 4

Positive Real Zeros	Negative Real Zeros	Imaginary Zeros
3	1	0
1	1	2

$$\begin{array}{r|rrrrr} -1 & 1 & -1 & 1 & -3 & -6 \\ & \downarrow & -1 & 2 & -3 & 6 \\ \hline & 1 & -2 & 3 & -6 & 0 \end{array}$$



$x^3 - 2x^2 + 3x - 6 = 0$

$(x^3 - 2x^2) + (3x - 6) = 0$

$x^2(x-2) + 3(x-2) = 0$

$(x-2)(x^2+3) = 0$

$x - 2 = 0$

$x = 2$

$x^2 + 3 = 0$

$x^2 = -3$

$x = \pm i\sqrt{3}$

Zeros: $-1,\ 2,\ \pm i\sqrt{3}$

14.) If k is constant, what is the value of k such that the polynomial $k^2x^3 - 6kx + 9$ is divisible by $x - 1$?

$$\begin{array}{r|rrrr} 1 & k^2 & 0 & -6k & 9 \\ & \downarrow & k^2 & k^2 & k^2-6k \\ \hline & k^2 & k^2 & k^2-6k & 0 \end{array}$$

$k^2 - 6k + 9 = 0$

$(k-3)(k-3) = 0$

$k - 3 = 0$ $k - 3 = 0$

$\boxed{k = 3}$

15.) Sketch the following polynomial.

$$f(m) = -(m-1)(m+4)^2$$

Lead Coefficient: -1

Degree: 3

Zero(s): 1, -4 (B)

End Behavior:

as $m \to \infty, f(m) \to$ $-\infty$

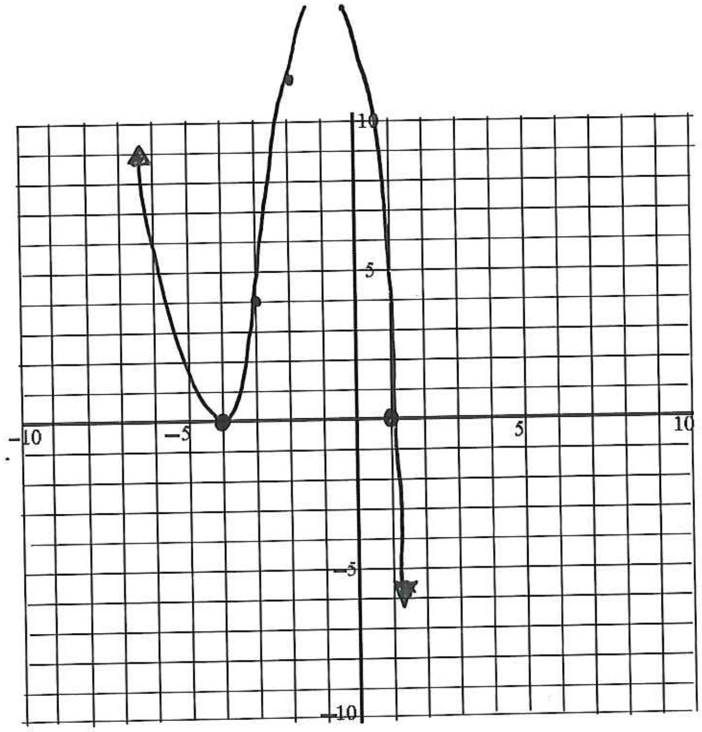
as $m \to -\infty, f(m) \to$ ∞

Relative Max: $(-0.67, 18.52)$

Relative Minimum: $(-4, 0)$

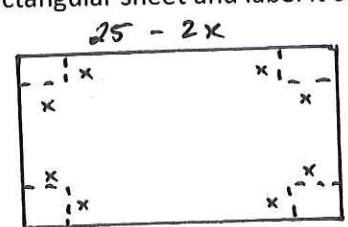
Intervals Increasing: $(-4, -0.67)$

Intervals Decreasing: $(-\infty, -4) \cup (-0.67, \infty)$



16.) In their spare time, your math teacher loves to build rectangular boxes. However, they need your help with this one. Your teacher wants to build a rectangular sheet of cardboard 15 inches by 25 inches. A small square of the same size is cut from each corner and each side is folded up along the cuts to form a lidless box.

A.) Sketch a picture of the rectangular sheet and label it correctly.



$\boxed{V(x) = (x)(25-2x)(15-2x)}$

B.) What length of square should be cut from each corner that would maximize the volume, $V(x)$, of the box?

$\boxed{\approx 3 \text{ IN}}$

* USED CALCULATOR TO FIND RELATIVE MAXIMUM FOR FUNCTION ABOVE

C.) What is the maximum volume, $V(x)$, of the box?

- $f(3) = (3)(25-2(3))(15-2(3))$
  $= (3)(19)(9)$

$\boxed{f(3) = 513 \text{ in}^3}$

D.) Your teacher has one stipulation to the volume of the box. Your teacher wants to know what size of square would produce a box with a volume equal to 400 cubic inches. Show your work algebraically.

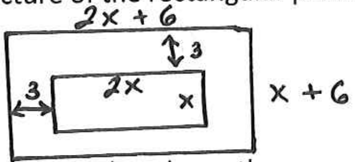
- $400 = (x)(25-2x)(15-2x)$
- $400 = (25x - 2x^2)(15-2x)$
- $400 = 375x - 50x^2 - 30x^2 + 4x^3$
- $0 = 4x^3 - 80x^2 + 375x - 400$

$\boxed{x = 1.5 \text{ AND } x = 4.8}$

* USE CALCULATOR TO FIND ZEROS/ROOTS

17.) A graphic artist is designing a poster that consists of rectangular print with a uniform border. The print is to be twice as tall as it wide, and the border is to be 3 inches wide. If the area of the poster is to be $680\ in^2$, find the dimensions of the print.

A.) Sketch a picture of the rectangular print and label it correctly.



B.) Write an equation that shows the area of the poster is $680\ in^2$.

- $A = l \cdot w$
- $\boxed{680 = (2x+6)(x+6)}$
- $680 = 2x^2 + 12x + 6x + 36$
- $680 = 2x^2 + 18x + 36$
- $\boxed{0 = 2x^2 + 18x - 644}$
- $0 = 2(x^2 + 9x - 322)$
- $0 = 2[x^2 + 23x - 14x - 322]$
- $0 = 2[x(x+23) - 14(x+23)]$
- $0 = 2(x+23)(x-14)$
- $x + 23 = 0 \qquad x - 14 = 0$
- $x = -23$
- $\boxed{x = 14}$

-322, 23, -14, 9

C.) Find the dimensions of the print.

POSTER
WIDTH $= x + 6 = 14 + 6 = 20$ IN
LENGTH $= 2x + 6 = 2(14) + 6 = 34$ IN

PRINT
WIDTH $= x = \boxed{14 \text{ IN}}$
LENGTH $= 2x = 2(14) = \boxed{28 \text{ IN}}$

18.) Match the following functions to their corresponding graph.

D $f(x) = -2x + 3$

G $f(x) = -2x^2 + 4x + 3$

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

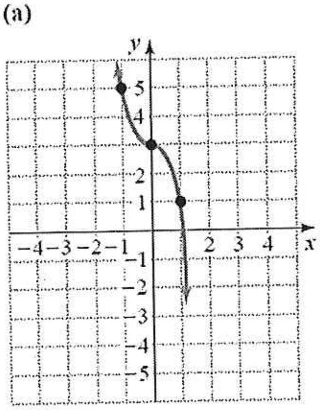
F $f(x) = -2x^2 + 3$

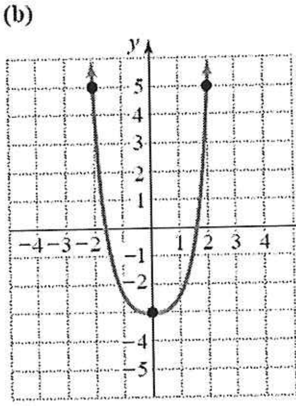
C $f(x) = -x^4 + 3$

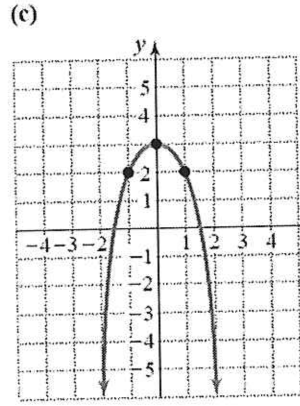
B $f(x) = \frac{1}{2}x^4 - 3$

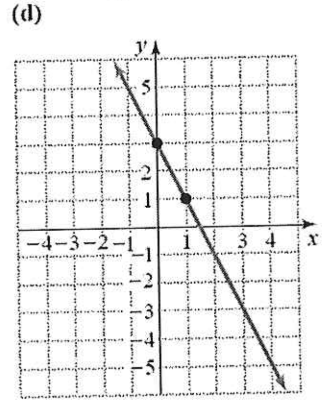
A $f(x) = -2x^3 + 3$

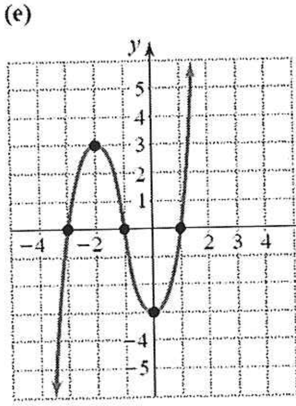
H $f(x) = x^3 - 3x^2$

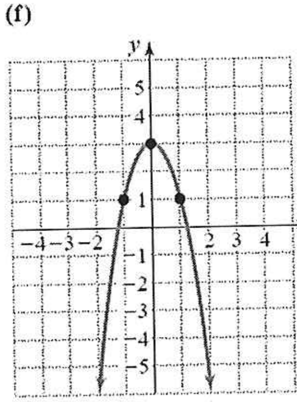
(a)


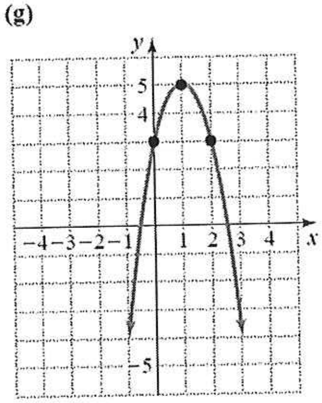
(b)


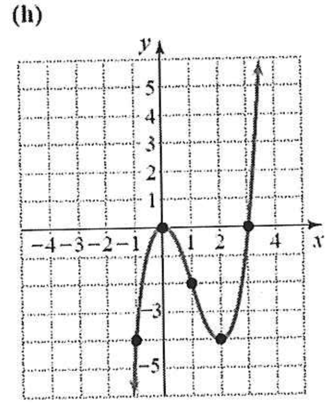
(c)


(d)


(e)


(f)


(g)


(h)


19.) What is the solution of the equation $\frac{2m^2+3m-5}{m^2+4m-5} = 4$?

-30, 15, -2, 13

- $4(M^2+4M-5) = 2M^2+3M-5$
- $4M^2+16M-20 = 2M^2+3M-5$
- $2M^2+13M-15 = 0$
- $2M^2+15M-2M-15=0$
- $(2M^2+15M)+(-2M-15)=0$
- $M(2M+15)-1(2M+15)=0$
- $(2M+15)(M-1)=0$
- $2M+15=0$ $M-1=0$

$\boxed{M=-15/2}$ $M=1$

EXTRENOUS

20.) The table shows several complex numbers, where i is the imaginary unit. Place an "x" in all appropriate cells in the table where the product of the two numbers is a real number.

	$8-2i$	3	i
$8+2i$	X		
$5i$			X
-4		X	

21.) An expression is given: $x^2-8x+21$

Determine the values of h and k that make the expression $(x-h)^2+k$ equivalent to given expression.

- $(x^2-8x+\underline{16})+21-\underline{16}$ $\left(\frac{-8}{2}\right)^2$
- $(x-4)^2+5$ $(-4)^2$

16

$h =$ 4, $k =$ 5

22.) Solve. $x^2-8x+21=(x-4)^2+3x-16$

- $x^2-8x+21 = x^2-8x+16+3x-16$
- $x^2-8x+21 = x^2-5x$
- $-8x+21 = -5x$
- $21 = 3x$
- $\boxed{7 = x}$

23.) What is the solution of the system of linear equations?

$$x - 9y + 4z = 1$$
$$-2x + 9y - 4z = 1$$
$$2x + y - 4z = -3$$

$x - 9y + 4z = 1$
$-2x + 9y - 4z = 1$
$-x = 2$
$x = -2$

$-2x + 9y - 4z = 1 \rightarrow -2x + 9y - 4z = 1$
$-1(2x + y - 4z = -3) \rightarrow -2x - y + 4z = 3$
$-4x + 8y = 4$
$-4(-2) + 8y = 4$
$8 + 8y = 4$
$8y = -4$
$y = -1/2$

$-2 - 9(-1/2) + 4z = 1$
$-2 + 9/2 + 4z = 1$
$5/2 + 4z = 1$
$4z = -3/2$
$z = -3/8$

$\boxed{(-2, -1/2, -3/8)}$

Solution: (, ,)

24.) The expression $x^2(x-y)^3 - y^2(x-y)^3$ can be written in the form $(x-y)^a(x+y)$, where a is a constant. What is the value of a ?

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

$\boxed{A = 4}$

25.) If $\sqrt{\sqrt[3]{(x+1)^5}} = (x+1)^a$, for $x \geq -1$, and a is a constant, what is the value of a?

- $\sqrt{(x+1)^{5/3}} = (x+1)^A$
- $\left((x+1)^{5/3}\right)^{1/2} = (x+1)^A$
- $(x+1)^{5/6} = (x+1)^A$

$\boxed{A = 5/6}$

26.) The functions f and g are defined by $f(x) = x^2$ and $g(x) = 2x$, respectively. Rewrite the function

$h(x) = \frac{f(2x)g(-2x)}{2}$ in terms of x.

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

$g(-2x) = 2(-2x)$
$g(-2x) = -4x$

- $h(x) = \frac{(4x^2)(-4x)}{2}$
- $h(x) = \frac{-16x^3}{2}$
- $\boxed{h(x) = -8x^3}$

27.) For each system of equations shown in the table, determine the number of points of intersection. Select one cell for each row.

System	No Points of Intersection	One Point of Intersection	Two Points of Intersection
$y = 1 - x^2$ $y = x - 1$			X
$y = 1 - x^2$ $y = 1$		X	
$y = 1 - x^2$ $y = 2 - x$	X		

28.) Write the expression $x - xy^2$ as the product of the greatest common factor and a binomial. Then, determine the complete factorization of $x - xy^2$.

Product of greatest common factor and binomial: $x(1-y^2)$

Complete Factorization: $x(1-y)(1+y)$

29.) Consider the expression $6x^3 - 5x^2y - 24xy^2 + 20y^3$.

A.) Which expression is equivalent to $6x^3 - 5x^2y - 24xy^2 + 20y^3$? * GROUPING

a.) $x^2(6x - 5y) + 4y^2(6x + 5y)$

b.) $x^2(6x - 5y) + 4y^2(6x - 5y)$

c.) $x^2(6x - 5y) - 4y^2(6x + 5y)$

$\boxed{\text{d.)}}$ $x^2(6x - 5y) - 4y^2(6x - 5y)$

B.) Which expression are factors of $6x^3 - 5x^2y - 24xy^2 + 20y^3$? Circle ALL that apply.

a.) $x^2 + 4y^2$

$\boxed{\text{b.)}}$ $6x - 5y$

$\boxed{\text{c.)}}$ $x + 2y$

d.) $6x + 5y$

$\boxed{\text{e.)}}$ $x - 2y$

- $(6x-5y)(x^2-4y^2)$
- $(6x-5y)(x+2y)(x-2y)$

30.) Consider the function $f(x) = (2x-1)(x+4)(x-2)$.

a.) What is the $y-intercept$ of the graph of the function in the coordinate plane?

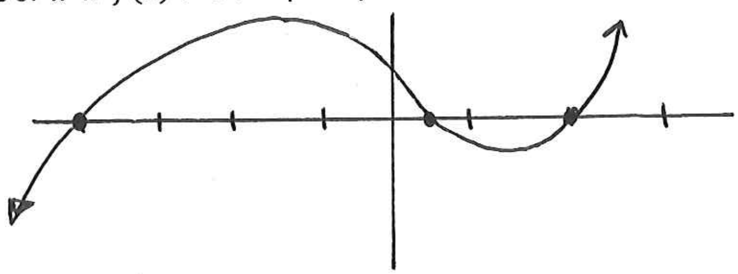
$$f(0) = (2(0)-1)(0+4)(0-2)$$
$$= (-1)(4)(-2)$$
$$= 8$$

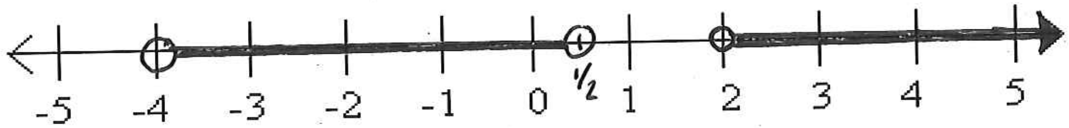
L.C. : POSITIVE

DEGREE : 3

ZEROS : $\frac{1}{2}$, 2, -4

b.) For what values of x is $f(x) > 0$? Express your answer on the number line.





c.) What is the end behavior of the function above?

As $x \to \infty, f(x) \to$ $\underline{\infty}$

As $x \to -\infty, f(x) \to$ $\underline{-\infty}$

d.) How many relative maximums does the function have?

a.) none $\boxed{\text{b.)}}$ one c.) two d.) three

THERE IS NO BETTER STUFFING THAN <u>MATH</u> STUFFING!!!!!!!!!!!!