

Algebra II Core – First Semester Midterm Review 2016 Part 1

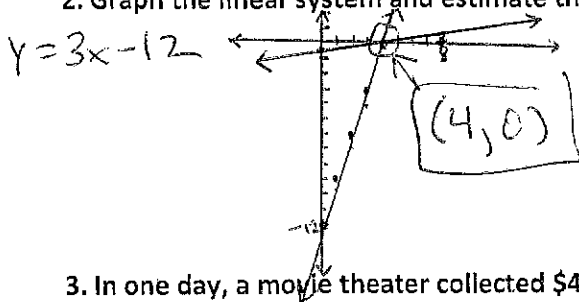
1. Solve the linear system:

$$\begin{cases} 2x + 3y = -2 \\ 4x + 7y = -6 \end{cases} \rightarrow \begin{array}{r} -4x - 6y = 4 \\ +4x + 7y = -6 \\ \hline y = -2 \end{array}$$

$$\begin{aligned} 2x + 3(-2) &= -2 \\ 2x - 6 &= -2 \\ +6 &+6 \\ \hline 2x &= 4 \\ \frac{2x}{2} &= \frac{4}{2} \quad x = 2 \end{aligned}$$

(2, -2)

2. Graph the linear system and estimate the solution:



$$\begin{cases} 3x - y = 12 \\ -x + 8y = -4 \end{cases} \rightarrow \begin{array}{r} 3x - y = 12 \\ -3x \quad -3x \\ \hline -y = -3x + 12 \\ \frac{-y}{-1} = \frac{-3x + 12}{-1} \\ y = 3x - 12 \end{array}$$

$$\begin{array}{r} +x \quad +x \\ \frac{8y}{8} = \frac{x-4}{8} \\ y = \frac{1}{8}x - \frac{1}{2} \end{array}$$

3. In one day, a movie theater collected \$4600 from 800 people. The price of admission is \$7 for an adult and \$5 for a child. How many adults and how many children were admitted to the movie theater that day?

$$\begin{aligned} 4600 &= 7A + 5C \\ 800 &= A + C \end{aligned}$$

$$\begin{array}{r} 4600 = 7A + 5C \\ -5600 = -7A - 7C \\ \hline -1000 = -2C \\ \frac{-1000}{-2} = \frac{-2C}{-2} \end{array}$$

C = 500 children
A = 300 Adults

4. Solve the system of equations:

$$\begin{cases} 4x + 5y + 3z = 15 \\ x - 3y + 2z = -6 \\ -x + 2y - z = 3 \end{cases}$$

① ~~4x + 5y + 3z = 15~~
② ~~-4x + 12y - 8z = 24~~

*4

② ~~x - 3y + 2z = -6~~
③ ~~-x + 2y - z = 3~~

④ $17y - 5z = 39$

$$\begin{array}{r} 17y - 5z = 39 \\ -5y + 5z = -15 \\ \hline 12y = 24 \\ \frac{12y}{12} = \frac{24}{12} \end{array}$$

$y = 2$

⑤ $-y + z = -3$

plugin

$$\begin{array}{r} -2 + z = -3 \\ +2 \quad +2 \\ \hline z = -1 \end{array}$$

$z = -1$

Plug both in

$$\begin{aligned} -x + 2(2) - (-1) &= 3 \\ -x + 4 + 1 &= 3 \\ -x + 5 &= 3 \\ -5 \quad -5 \\ \hline -x &= -2 \\ x &= 2 \end{aligned}$$

(2, 2, -1)

5. Graph the system of linear inequalities:

$$\begin{aligned} x+y &\geq -3 \\ -x &\quad -x \end{aligned}$$

$$y \geq -x-3$$

$$y \geq -\frac{1}{6}x-3$$

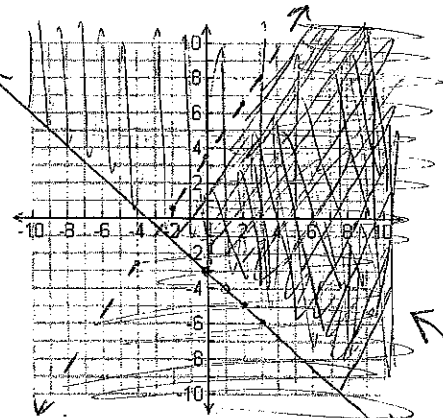
$$\begin{aligned} x+y &\geq -3 \\ -6x+4y &< 14 \end{aligned}$$

$$\begin{aligned} -6x+4y &< 14 \\ +6x &\quad +6x \end{aligned}$$

$$\frac{4y}{4} < \frac{6x+14}{4}$$

$$y < \frac{3x}{2} + \frac{7}{2}$$

$$y < \frac{3}{2}x + 3.5$$



Solution

6. Which ordered pair is a solution to the system in #7?

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

a) (-3,1)

b) (1,1)

c) (0,4)

d) (-4,0)

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

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

$$4 = (0-2)(0+3)$$

$$0 = (-4-2)(-4+3)$$

$$1 = (-5)(0)$$

$$1 = (-1)(4)$$

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

$$0 = (-6)(-1)$$

1 ≠ 0 **No!**

1 ≠ 4 **No!**

4 = -6 **No!**

0 ≠ 6 **No!**

7. Graph the function: $y = (x-2)(x+3)$

Zeros: (2,0) (-3,0)

Half way

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

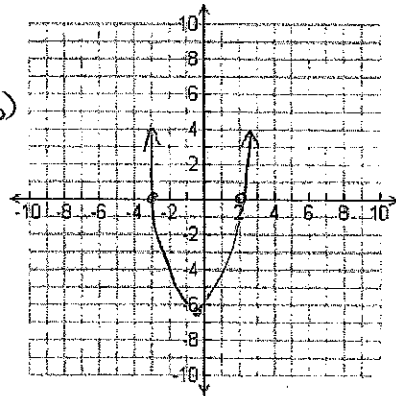
$$x = -\frac{1}{2}$$

$$y = (-\frac{1}{2}-2)(-\frac{1}{2}+3)$$

$$y = (-2.5)(2.5)$$

$$y = -6.25$$

$$(-\frac{1}{2}, -6.25)$$



8. Write the equation $y = x^2 + 4x - 12$ in intercept form of a quadratic.

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

9. Solve $x^2 - x = 0$

$$x(x-1) = 0$$

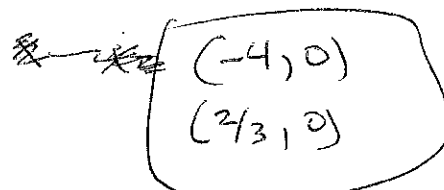
(0,0) (1,0)

10. Solve $3x^2 + 10x - 8 = 0$

$$x^2 + 10x - 24$$

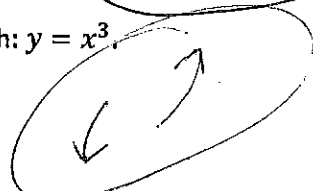
$$(x + \frac{12}{3})(x - \frac{2}{3})$$

$$(x+4)(x-\frac{2}{3})$$



11. Describe the end behavior for the graph: $y = x^3$

Odd Positive



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

12. Solve $6x^2 - 7x = 5$.

$$6x^2 - 7x - 5 = 0$$

$$x^2 - 7x - 30 = 0$$

$$(x - 10)(x + 3) = 0$$

$$(x - \frac{5}{3})(x + \frac{1}{2}) = 0$$

$$x = \frac{5}{3}$$

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

13. Solve $x^2 + 6x - 3 = 0$.

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

$$x = \frac{-6 \pm \sqrt{36 + 12}}{2} = \frac{-6 \pm \sqrt{48}}{2}$$

$$x = \frac{-6 \pm 4\sqrt{3}}{2} = -3 \pm 2\sqrt{3}$$

14. Solve $(3x - 4)^2 = 60$.

$$(3x - 4)(3x - 4) = 60$$

$$9x^2 - 12x - 12x + 16 = 60$$

$$9x^2 - 24x - 44 = 0$$

a b c

$$x = \frac{-(-24) \pm \sqrt{(-24)^2 - 4(9)(-44)}}{2(9)}$$

$$\frac{24 \pm \sqrt{576 + 1584}}{18} = \frac{24 \pm \sqrt{2160}}{18}$$

$$\frac{24 \pm 12\sqrt{15}}{18} = \frac{4 \pm 2\sqrt{15}}{3}$$

15. Solve $x^2 + 10x + 8 = -5$.

$$x^2 + 10x + 13 = 0$$

$$x = \frac{-10 \pm \sqrt{10^2 - 4(1)(13)}}{2(1)} = \frac{-10 \pm \sqrt{100 - 52}}{2}$$

$$\frac{-10 \pm \sqrt{48}}{2} = \frac{-10 \pm 4\sqrt{3}}{2} = -5 \pm 2\sqrt{3}$$

16. Solve $4x^2 + 24x - 11 = 0$.

$$x = \frac{-24 \pm \sqrt{24^2 - 4(4)(-11)}}{2(4)} = \frac{-24 \pm \sqrt{24^2 + 176}}{8}$$

$$\frac{-24 \pm \sqrt{752}}{8} = \frac{-6 \pm \sqrt{47}}{2}$$

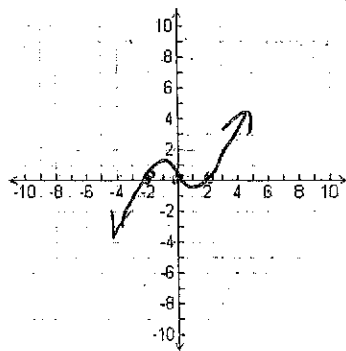
17. Solve $x^3 - 4x^2 = 0$.

$$x^2(x - 4) = 0$$

$$x = 0$$

$$x = 4$$

18. Graph $f(x) = x^3 - 4x$.



$$x(x^2 - 4)$$

$$x(x+2)(x-2)$$

Zeros (0,0)
(-2,0)
(2,0)

End Behavior
odd positive
↙ ↗

19. Find all of the zeros of the function $f(x) = 3(-x + 1)(3x - 4)(4x + 5)$.

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

20. Write a polynomial function that has zeros 4, -1, 2 and has a leading coefficient of 1.

A) in intercept form.

$$y = (x - 4)(x + 1)(x - 2)$$

B) in standard form.

$$y = (x - 4)(x + 1)(x - 2)$$

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

$$y = x^3 - 5x^2 + 2x + 8$$

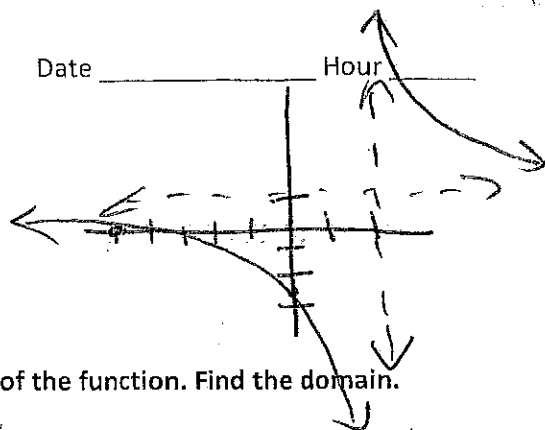
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21. Graph $f(x) = \frac{x+5}{x-2}$.

*Use your Calc!

V. Asym: $x=2$
 H. Asym: $y=1$
 y-int: $(0, -2.5)$
 x-int: $(-5, 0)$



22. Identify all horizontal and vertical asymptotes of the graph of the function. Find the domain.

$f(x) = \frac{x^2}{x^2 - 16}$

V. Asym: $x=4, x=-4$
 H. Asym: $y=1$

Domain: All real #'s except 4 & -4

23. Add $\frac{12}{x^2+5x+24} + \frac{3}{x-3} \left(\frac{x+8}{x+8} \right)$

$$\frac{12}{(x-3)(x+8)} + \frac{3(x+8)}{(x-3)(x+8)} = \frac{12+3x+24}{(x-3)(x+8)}$$

$$\frac{3x+36}{(x-3)(x+8)} = \frac{3(x+12)}{(x-3)(x+8)}$$

24. Solve. Check for extraneous solutions.

~~$\frac{4}{x+2} = \frac{14}{2x-1}$~~

$$\begin{aligned} 4(2x-1) &= 14(x+2) \\ 8x-4 &= 14x+28 \\ -8x & \quad -8x \\ -4 &= 6x+28 \\ -28 & \quad -28 \end{aligned}$$

$$\frac{-32}{6} = \frac{6x}{6}$$

$x = -5.33$

Extraneous
 $x = -2$
 $x = 1/2$

25. In the quadratic formula $y = ax^2 + bx + c$, how does "a" affect the graph and how does "c" affect the graph?

"a"

When a increase, the graph gets skinnier.

When a decreases, the graph gets wider.

"c"

when c increases, the graph moves up.

When c decreases,

the graph moves down.

27. The price per person of renting a cabin varies inversely with the number of people renting the cabin.

It cost \$40 per person if 8 people rent the cabin. How much will it cost per person if 12 people rent the cabin?

$$P = \frac{K}{R}$$

$$8 \cdot 40 = \frac{K}{8} \cdot 8$$

$$P = \frac{320}{12}$$

$$K = 320$$

$$P = \$26.67$$