MATH 1310

Final Exam Review

1. **Find the slope of the line that passes through the points $(4,6)$ and $(-2,-4)$.**

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-4-6}{-2-4} = \frac{-10}{-6} = \frac{10}{6} = \boxed{\frac{5}{3}}$$

2. Find the x and y intercepts $2x + 8y + 2 = 0$.

x-int:

set $y=0$

$2x+8(0)+2=0$

$2x+2=0$

$2x=-2$

$x=-1$

$(-1,0)$

y-int:

set $x=0$

$2(0)+8y+2=0$

$8y+2=0$

$8y=-2$

$y=\frac{-2}{8}=\frac{-1}{4}$

$(0,-1/4)$

Slide3

3. **Solve for x:** $\frac{2}{3}x = \frac{4}{5}$ $\rightarrow \frac{2}{3} \cdot \frac{x}{1} = \frac{4}{5}$

$$\frac{2x}{3} = \frac{4}{5}$$

$$10x = 12$$

$$x = \frac{12}{10} = \boxed{\frac{6}{5}}$$

<u>Check</u>

$$\frac{2}{3} \cdot \frac{6}{5} = \frac{4}{5}$$

$$\frac{12}{15} = \frac{4}{5}$$

$$\frac{4}{5} = \frac{4}{5} \checkmark$$

Slide4

4. **Solve for x:** $\frac{1}{2}(x+1)-\frac{1}{3}(x-2)=4$

$$3\cdot\left[\frac{1}{2}(x+1)-\frac{1}{3}(x-2)=4\right]\cdot 3$$

$$2\cdot\left[\frac{3}{2}(x+1)-(x-2)=12\right]\cdot 2$$

$$3(x+1)-2(x-2)=24$$

$$3x+3-2x+4=24$$

$$x+7=24$$

$$-7\quad -7$$

$$\boxed{x=17}$$

Check

$$\frac{1}{2}(17+1)-\frac{1}{3}(17-2)=4$$

$$\frac{1}{2}(18)-\frac{1}{3}(15)=4$$

$$9-5=4$$

$$4=4\checkmark$$

5. The perimeter of a rectangle is 70 m. If the length is 4 times its width. Find the length of this rectangle.

$P = 70$

$\ell = 4w$

$P = 70$

$2\ell + 2w = 70$

$2(4w) + 2w = 70$

$8w + 2w = 70$

$10w = 70$

$w = 7$

$\ell = 4 \cdot w$

$\ell = 4 \cdot 7$

$\ell = 28$

$\boxed{28m}$

6. Find three consecutive integers whose sum is 336.

First: x

Second: $x+1$

Third: $x+2$

$$x + x+1 + x+2 = 336$$

$$3x + \cancel{3} = 336$$

$$\cancel{-3} \quad -3$$

$$\frac{\cancel{3}x}{\cancel{3}} = \frac{333}{3}$$

$$x = 111$$

$$\boxed{111, 112, 113}$$

Slide7

7. **Solve by factoring:** $2x^2 + 5x + 3 = 0$

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

$$2x(x+1) + 3(x+1) = 0$$

$$(x+1)(2x+3) = 0$$

$$x + \cancel{1} = 0 \qquad -\cancel{1} \; -1 \qquad x = -1$$

$$2x + \cancel{3} = 0 \qquad -\cancel{3} \; -3 \qquad \frac{\cancel{2}x}{\cancel{2}} = \frac{-3}{2} \qquad x = -3/2$$

$$\boxed{\{-3/2, -1\}}$$

$ac = 6$

6		sum
1	6	7
2	3	5

Slide8

8. Solve by factoring: $x^2 + \cancel{36} = 0$

$$\underline{\quad -\cancel{36} \quad -36}$$

$$x^2 = -36$$

$$\sqrt{x^2} = \pm\sqrt{-36}$$

$$\boxed{x = \pm 6i}$$

9. **Simplify:** $(2i - 1) - (1 - i)$

$$(-1+2i)-(1-i)$$

$$(-1+2i)+(-1+i)$$

$$\boxed{-2+3i}$$

10. Simplify: $3i(2 - 3i)$

Remember: $i^2 = -1$

$$6i - 9i^2$$

$$6i - 9(-1)$$

$$6i + 9$$

$$\boxed{9 + 6i}$$

11. Simplify: $\frac{2+3i}{4+i}$

$$\frac{(2+3i)}{(4+i)}\frac{(4-i)}{(4-i)} = \frac{8-2i+12i-3i^2}{16-\cancel{4i}+\cancel{4i}-i^2} = \boxed{\frac{11+10i}{17}}$$

$+3$

$+1$

$$\boxed{\frac{11}{17}+\frac{10}{17}i}$$

12.Simplify: $\frac{1}{3-i}$

$$\frac{1}{(3-i)}\frac{(3+i)}{(3+i)} = \frac{3+i}{9-\underbrace{i^2}_{+1}} = \frac{3+i}{10} = \boxed{\frac{3}{10}+\frac{1}{10}i}$$

13. Solve for x: $-2 \le \frac{(3x+2)}{3} < 2$

$$3 \cdot \left[-2 \le \left(\frac{3x+2}{3}\right)^{\cdot 3} < 2\right] \cdot 3$$

$$-6 \le 3x+\cancel{2} < 6$$

$$\underline{-2} \qquad \underline{-\cancel{2}} \qquad \underline{-2}$$

$$\frac{-8}{3} \le \frac{\cancel{3}x}{\cancel{3}} < \frac{4}{3}$$

$$-\frac{8}{3} \le x < \frac{4}{3}$$

$$\boxed{\left[-\frac{8}{3}, \frac{4}{3}\right)}$$

Slide14

14. Solve of x: $\cancel{5} + 2|x + 5| = 7$

$$-\cancel{5} \qquad -5$$

$$\frac{\cancel{2}|x+5|}{\cancel{2}} = \frac{2}{2}$$

$$|x+5| = 1$$

$$x + \cancel{5} = -1$$
$$-\cancel{5} \quad -5$$
$$x = -6$$

$$x + \cancel{5} = 1$$
$$-\cancel{5} \quad -5$$
$$x = -4$$

$$\boxed{\{-6, -4\}}$$

15. Solve for x: $-\cancel{2}|x-1| \le -6$

$$\frac{\cancel{-2}}{-2} \quad \frac{}{-2}$$

$$|x-1| \geq 3$$

$$x\cancel{-1} \le -3 \quad \text{or} \quad x\cancel{-1} \geq 3$$

$$\cancel{+1} \quad +1 \qquad \cancel{+1} \quad +1$$

$$x \le -2 \quad \text{or} \quad x \geq 4$$

$$\boxed{(-\infty, -2] \cup [4, \infty)}$$

16. Solve for x: $|3x - 4| < 5$

$$-5 < 3x \cancel{-4} < 5$$

$$+4 \qquad \cancel{+4} \qquad +4$$

$$\frac{-1}{3} < \frac{\cancel{3}x}{\cancel{3}} < \frac{9}{3}$$

$$-\frac{1}{3} < x < 3$$

$$\left(-\frac{1}{3}, 3\right)$$

17. Find the domain: $f(x) = \frac{x+2}{x-1}$

Remove wherever the denominator equals zero.

$x - 1 = 0$

$x = 1$

All Real numbers except 1.

$\boxed{(-\infty, 1) \cup (1, \infty)}$

18. Find the domain: $f(x) = \sqrt{3x + 9}$

Must have No negative numbers inside even Roots.

$$3x + \cancel{9} \geq 0$$
$$-\cancel{9} \quad -9$$
$$\frac{\cancel{3}x}{\cancel{3}} \geq \frac{-9}{3}$$
$$x \geq -3$$
$$\boxed{[-3, \infty)}$$

If it was

$$f(x) = \sqrt[3]{3x+9}$$

Domain is all Real Numbers.

$$(-\infty, \infty)$$

19. Calculate $f(2)$ if $f(x) = -2x^2 + 3x - 2$.

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

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

$$f(2) = -8 + 6 - 2$$

$$f(2) = -2 - 2 = \boxed{-4}$$

$(2, -4)$

20. Calculate $f(4)$ if $f(x) = \begin{cases} x - 1 & x < 2 \\ 3 & x = 2 \\ \boxed{-x \quad 2 < x} \end{cases}$

$4 < 2$ × No

$4 = 2$ × No

$2 < 4$ ✓ Yes

$$\boxed{f(4) = -4}$$

$(4, -4)$

21. Solve for x using substitution:

$3x^8 - 14x^4 - 5 = 0$

$u = x^4$

$u^2 = x^8$

$3u^2 - 14u - 5 = 0$

$(3u^2 - 15u) + (1u - 5) = 0$

$3u(u-5) + 1(u-5) = 0$

$(3u+1)(u-5) = 0$

$ac = -15$

$-15 + 1 = -14$

$3u + 1 = 0$

$3u = -1$

$u = -1/3$

$u - 5 = 0$

$u = 5$

$u = x^4$

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

complex

$\boxed{\pm\sqrt[4]{\frac{-1}{3}} = x \qquad \pm\sqrt[4]{5} = x}$

21. Solve for x using substitution: 3x8 – 14x4 - 5

22. What reflections and transformations take $f(x) = |x|$ to the function $f(x) = 3 - |x - 1|$

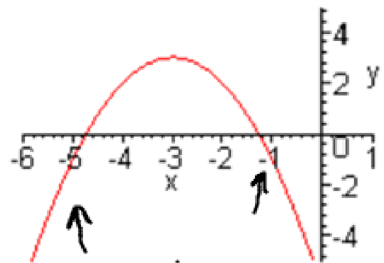
$f(x) = -|x-1| + 3$

Horizontal Shift: Right 1

Reflections: Vertical or x-axis reflection

Vertical Shift: Up 3

23. **Find the function form the graph.**



x-int:
$(-5,0)$; $(-1,0)$

vertex of $(-3,2) = (h,k)$

$y = a(x-h)^2 + k$

$y = a(x+3)^2 + 2$

Plug in one point $(-1,0)$

$0 = a(-1+3)^2 + 2$

$0 = a(2)^2 + 2$

$0 = 4a + 2$

$-2 = 4a \rightarrow a = \frac{-1}{2}$

$$\boxed{f(x) = \frac{-1}{2}(x+3)^2 + 2}$$

Slide24

24. **Find the vertex; $f(x) = x^2 - 14x + 64$**

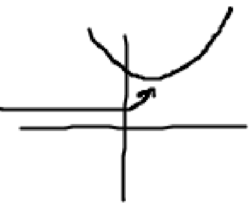
$$x = \frac{-b}{2a} = \frac{14}{2(1)} = 7$$

$$f(7) = 7^2 - 14(7) + 64$$

$$f(7) = 49 - 98 + 64$$

$$f(7) = -49 + 64$$

$$f(7) = 15$$



(7, 15) :

minimum point

Slide25

25. **Find the vertex:** $f(x) = -2x^2 - 8x + 5$

$$x = \frac{-b}{2a} = \frac{8}{2(-2)} = \frac{8}{-4} = -2$$

$$f(-2) = -2(-2)^2 - 8(-2) + 5$$

$$f(-2) = -2(4) - 8(-2) + 5$$

$$f(-2) = -8 + 16 + 5$$

$$f(-2) = 8 + 5 = 13$$

$$\boxed{(-2, 13)}$$

26. Given $f(x) = 2x + 3$ and $g(x) = x^2 + 2x$

a. Find $(f \circ g)(x) = f(g(x)) = f(x^2+2x) = 2(x^2+2x)+3$

$$\boxed{2x^2+4x+3}$$

b. Find $(g \circ f)(-1)$

$g(f(-1)) = g(1) = 1^2 + 2(1) = 1+2 = \boxed{3}$

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

27. **Find the inverse of** $f(x) = \dfrac{1}{x-1}$

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

(swap x & y)

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

$$x(y-1) = 1$$

$$xy \cancel{- x} = 1$$

$$\cancel{+x} \quad +x$$

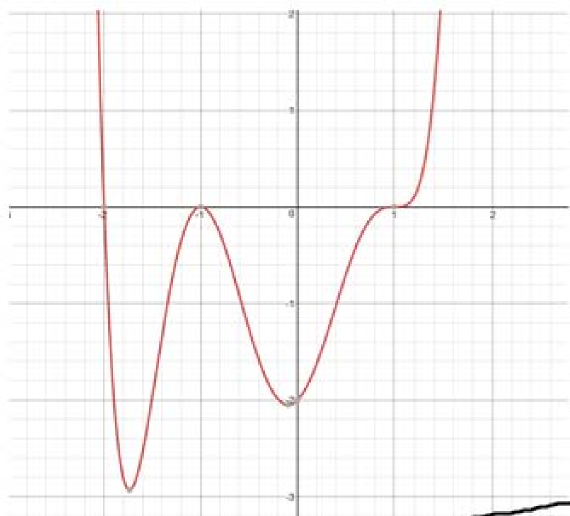
$$xy = x+1$$

$$\frac{\cancel{x}y}{\cancel{x}} = \frac{x+1}{x}$$

$$y = \frac{x+1}{x} = \frac{x}{x} + \frac{1}{x} = 1 + \frac{1}{x}$$

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

28. The function which corresponds to the graph.



x-int: $x = -2$ (Mult: 1)

$x = -1$ (Mult: 2)

$x = 1$ (Mult: 3)

y-int: $y = -2$

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

$$-2 = a(0+2)(0+1)^2(0-1)^3$$

$$-2 = a(2)(1)(-1) = -2a$$

$$1 = a$$

$$\boxed{f(x) = (x+2)(x+1)^2(x-1)^3}$$

29 Find the quotient and remainder $\frac{2x^3 + 13x^2 + 28x + 21}{x^2 + 3x + 1}$

$$
\begin{array}{r l}
 & \quad 2x + 7 \\
x^2 + 3x + 1 \overline{)} & \cancel{2x^3} + 13x^2 + 28x + 21 \\
 & -(\cancel{2x^3} + 6x^2 + 2x) \downarrow \\
\hline
 & \quad \cancel{7x^2} + 26x + 21 \\
 & -(\cancel{7x^2} + 21x + 7) \\
\hline
 & \quad 5x + 14
\end{array}
$$

$$\boxed{\begin{array}{l} Q(x) = 2x + 7 \\ R(x) = 5x + 14 \end{array}}$$

30. Find the quotient and the remainder $\frac{-2x^2+14x-16}{x-1}$

$$
\begin{array}{r|rrr}
1 & -2 & 14 & -16 \\
  & \downarrow & -2 & 12 \\
\hline
  & -2 & 12 & \boxed{-4}
\end{array}
\rightarrow \text{Remainder}
$$

$$\boxed{\begin{array}{l} Q(x) = -2x+12 \\ R(x) = -4 \end{array}} \quad \text{or} \quad \boxed{-2x+12-\frac{4}{x-1}}$$

$$Q(x)+\frac{R(x)}{D(x)}$$

Slide31

31. Find the zeros of a polynomial by factoring:

$f(x) = x^2 - 8x + 16$

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

$x-4=0$	$x-4=0$
$x=4$	$x=4$

Zeroes: $\boxed{x=4 \ (\text{Mult}: 2)}$

32. Given $f(x) = 5 - 4^x = -4^x + 5$ HA

a. Asymptote? $y = 5$ (HA)

b. Range? $(-\infty, 5)$

$5 - 4^x \rightarrow 5 - (\text{Numbers}) \rightarrow$ Range is values smaller than 5

33. What is the transformation of the key point (1, 0):
$\log_6(x - 2) - 4$

Horizontal shift (Right 2): $(1, 0) \rightarrow (3, 0)$

No Reflection

Vertical shift (Down 4): $(3, 0) \rightarrow \boxed{(3, -4)}$

34. **Simplify:** $f(x) = \log_2\left(\frac{1}{2^3}\right) = \log_{\cancel{2}}(\cancel{2}^{-3}) = \boxed{-3}$

$\frac{1}{2^3} = 2^{-3}$

(reciprocal)

35. **Solve: $\log_4(x-1)=0$**

Rewrite in exponential form

$$4^0 = x-1$$

$$1 = x-1$$

$$+1 \qquad +1$$

$$\boxed{2 = x}$$

make sure the answer does an undefined logarithm.

$\log_4(x-1) \Rightarrow \log_4(2-1) = \log_4(1)$

defined

36. **Solve: $\ln x = 2$**

$$\log_e x = 2$$

$$\boxed{e^2 = x}$$

37. **Solve: $\log(x+2)+\log(x-1)=\log 10$**

Compress the logarithms first.

$$\log\left((x+2)(x-1)\right)=\log 10$$

$$\log(x^2+x-2)=\log 10$$

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

$$-10 \quad -10$$

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

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

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

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

$x=-4$ | $\boxed{x=3}$

↓

creates undefined logarithms

38. Solve the following for x: $\frac{5}{2x} + \frac{6}{x} = \frac{17}{6}$

$$2x\left[\frac{5}{2x} + \frac{6}{x} = \frac{17}{6}\right]2x$$

$$\frac{\cancel{(2x)}(5)}{\cancel{2x}} + \frac{(2\cancel{x})(6)}{\cancel{x}} = \frac{17(\cancel{2}x)}{\cancel{6}3}$$

$$5 + 12 = \frac{17x}{3}$$

$$17 = \frac{17x}{3}$$

$$\frac{51}{17} = \frac{\cancel{17}x}{\cancel{17}}$$

$$\boxed{3 = x}$$

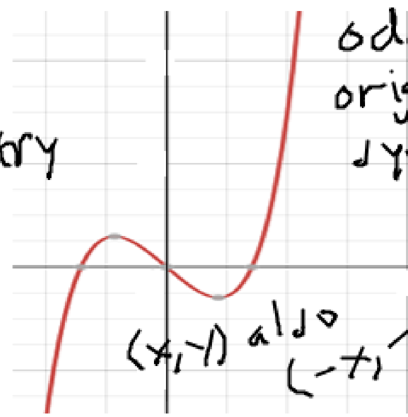
38. Solve the following for x: 5 2?? + 6 ?? = 17 6

$f(x)$ is an even function: if it passes through (x, y), also $(-x, y)$

39. The function
$f(x) = ax^8 + bx^6 - cx^4 + dx^2 + e$
passes through the point (-3, 7). What other point must it pass through? (3, 7)

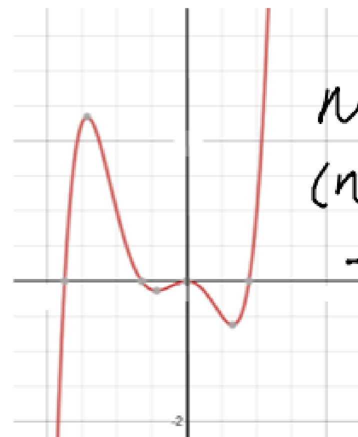
Which is a possible graph of this function:

Even: y-axis symmetry



odd: origin symmetry

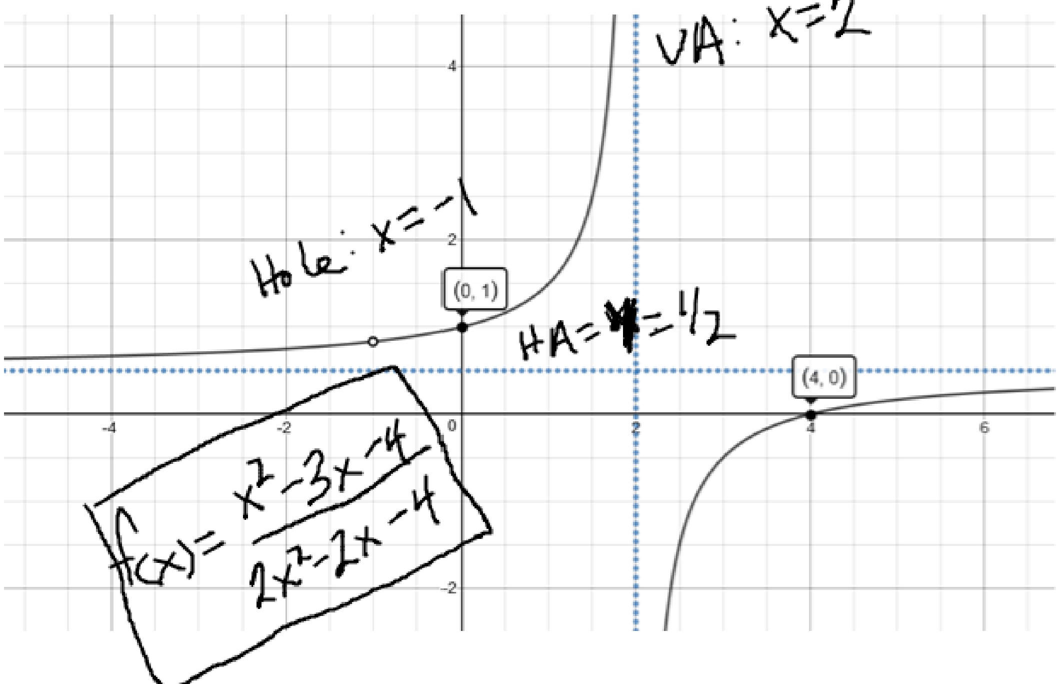
$(x, -y)$ also $(-x, -y)$



Neither (No symmetry)

39. The function f(x)= ax8 + bx6 − cx4 + dx2 + e passes through the point (-3, 7). What other point must it p

Determine the function of the following: Rational



Num & Den: Hole

Den only: VA

Num only: x-int.

$$f(x) = \frac{1(x+1)(x-4)}{2(x+1)(x-2)}$$

HA: $y = \frac{1}{2}$ $\rightarrow$ Mult Num, $\rightarrow$ Mult Den

$$f(0) = \frac{1(1)(-4)}{2(1)(-2)} = \frac{-4}{-4} = 1$$

Y-int is good.

Determine the function of the following:

Solve the system: $\begin{aligned} y &= 4x + 1 \\ 2x + 3y &= -39 \end{aligned}$

Substitution

$2x + 3(4x+1) = -39$

$2x + 12x + 3 = -39$

$14x + \cancel{3} = -39$

$\quad\; -\cancel{3} \quad\;\; -3$

$\dfrac{\cancel{14}x}{\cancel{14}} = \dfrac{-42}{14}$

$x = -3$

$y = 4(-3) + 1 = -12 + 1 = -11$

$\boxed{(-3, -11)}$

Check:

$2(-3) + 3(-11) = -39$

$-6 - 33 = -39$

$-39 = -39$

Solve the system: ??=4??+1 2??+3??=-39

Now, solve this system: $8x + 2y = 3$
$y = \boxed{-4x + 2}$

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

$$8x - 8x + 4 = 3$$

$$4 \neq 3$$

Not a True statement

$\boxed{\text{No Answer}}$

If all the x's cancel to a true statement, then there are infinite answers.

Now, solve this system: 8??+2??=3 ??=-4??+2

Rewrite the equation of the parabola in standard form: $y = (2x^2 + 16x) - 5$

completing the square:

$$Y = 2(x^2 + 8x) - 5$$

$$b = 8$$

$$\frac{b}{2} = 4$$

$$\left(\frac{b}{2}\right)^2 = 16$$

$$a\left(\frac{b}{2}\right)^2$$

$$Y = 2(x^2 + 8x + 16) - 2(16) - 5$$

$$Y = 2(x+4)^2 - 32 - 5$$

$$\boxed{Y = 2(x+4)^2 - 37}$$

Rewrite the equation of the parabola in standard form: y = 2x2 + 16x – 5

Simplify: $\frac{\sqrt{-25}+3}{\sqrt{-9}\cdot\sqrt{-16}} = \frac{5i+3}{3i\cdot 4i} = \frac{5i+3}{12i^2}$

$$\frac{5i+3}{-12} = \frac{3}{-12} + \frac{5}{-12}i = \boxed{\frac{-1}{4} - \frac{5}{12}i}$$

Simplify: -25 +3 -9 · -16

Find all complex solutions to: $3x^2=75$

$$\frac{\cancel{3}x^2}{\cancel{3}} = \frac{75}{3}$$

$$x^2 = 25$$

$$\sqrt{x^2} = \pm\sqrt{25}$$

$$\boxed{x = \pm 5}$$

Different example:

$$8x^2 + \cancel{32} = 0$$
$$\quad\; -\cancel{32} \quad -32$$

$$\frac{\cancel{8}x^2}{\cancel{8}} = \frac{-32}{8}$$

$$x^2 = -4$$

$$\sqrt{x^2} = \pm\sqrt{-4}$$

$$\boxed{x = \pm 2i}$$

Find all complex solutions to: 3x2=75

Solve for x: $\sqrt{x+3} - 3 = x$

$$\sqrt{x+3} \cancel{-3} = x$$
$$\cancel{+3} \quad +3$$

$$\left(\sqrt{x+3}\right)^2 = (x+3)^2 = (x+3)(x+3)$$

$$\cancel{x} \cancel{+3} = x^2 + 6x + 9$$
$$\cancel{-x} \cancel{-3} \qquad -x \quad -3$$

$$0 = x^2 + 5x + 6$$
$$0 = (x+3)(x+2)$$

$$x+3=0 \qquad x+2=0$$
$$\boxed{x=-3} \qquad \boxed{x=-2}$$

Check: $x=-3$

$$\sqrt{-3+3} \; -3 = -3$$
$$\sqrt{0} \; -3 = -3$$
$$-3 = -3 \checkmark$$

$x=-2$

$$\sqrt{-2+3} \; -3 = -2$$
$$\sqrt{1} - 3 = -2$$
$$1 - 3 = -2$$
$$-2 = -2 \checkmark$$

Solve for x: ??+3 -3=??

Solve the inequality: $7x^2 - 5x < 5x^2 + 3$

$-5x^2 \quad -3 \quad -5x^2 \quad -3$

$a \cdot c = -6$

$-6 \quad +1$

$2x^2 - 5x - 3 < 0$

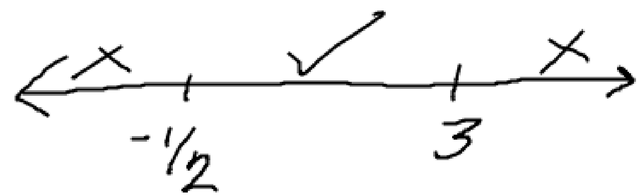
$(2x^2 - 6x) + (x - 3) < 0$

$2x(x-3) + (x-3) < 0$

$(x-3)(2x+1) < 0$

$x - 3 = 0 \qquad 2x + 1 = 0$

$x = 3 \qquad x = -\frac{1}{2}$



Test $x = 0$

$7(0)^2 - 5(0) < 5(0)^2 + 3$

$0 < 3$

True

$\boxed{\left(-\frac{1}{2}, 3\right)}$

Solve the inequality:7x2 – 5x < 5x2 + 3

Solve the inequality: $\dfrac{\overset{(x-3)(x+2)}{x^2-x-6}}{x+1} \geq 0$ $\boxed{[-2,-1) \cup [3,\infty)}$

Num: [,]

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

$x=3$ $x=-2$

Den: (,)

$x+1=0$

$x=-1$

Test $x=-5$: $\dfrac{(-)(-)}{(-)} = \text{Neg} \ngeq 0$

Test $x=-1.5$: $\dfrac{(-)(+)}{(-)} = \text{Pos} \geq 0$

Test $x=0$: $\dfrac{(-)(+)}{(+)} = \text{Neg} \ngeq 0$

Test $x=5$: $\dfrac{(+)(+)}{(+)} = \text{Pos} \geq 0$

Solve the inequality: ?? 2 -??-6 ??+1 =0

Write the polynomial function with roots of 2i and 6, with an x-intercept of 48.

$x = 2i$, $x = -2i$, $x = 6$

$f(x) = a(x-2i)(x+2i)(x-6)$

$f(x) = a(x^2 + \cancel{2ix} - \cancel{2ix} - 4i^2)(x-6)$ $+4$

$f(x) = a \; (x^2+4)(x-6)$

$f(x) = a \; (x^3 - 6x^2 + 4x - 24)$

$f(0) = a(-24) = 48$ (y-int)

$a = -2$

$f(x) = -2(x^3 - 6x^2 + 4x - 24)$

$\boxed{f(x) = -2x^3 + 12x^2 - 8x + 48}$

Write the polynomial function with roots of 2i and 6, with an x-intercept of 48.

Find the vertical asymptotes, horizontal asymptotes, and hole of the following:

$$f(x) = \frac{x^2+7x+10}{x^3-25x} = \frac{(x+5)(x+2)}{x(x+5)(x-5)}$$

Num, Den:	Num:	Den:	Larger exp in den.
$(x+5)=0$	$x+2=0$	$x=0$ $\quad x-5=0$	$\boxed{HA: y=0}$
$x=-5$	$x=-2$	$x=5$	
$\boxed{Hole: x=-5}$	x-int: $(-2, 0)$	$\boxed{VA: x=0,\ x=5}$	

Find the vertical asymptotes, horizontal asymptotes, and hole of the following: ?? ?? = ?? 2 +7??+10 ?? 3 -

Expand the logarithmic expression:

$$\log_2\left(\frac{\sqrt{x+4}\cdot(x-2)^3}{x^5}\right)$$

$$\log_2 (x+4)^{1/2} + \log_2 (x-2)^3 - \log_2 x^5$$

$$\frac{1}{2}\log_2 (x+4) + 3\log_2 (x-2) - 5\log_2 x$$

Reminder: All parts of numerator $\rightarrow$ + logs

Denominator $\rightarrow$ − logs

Expand the logarithmic expression: log 2 ??+4 · ??-2 3 ?? 5

Simplify: $\log_5\left(\frac{1}{125}\right) = \cancel{\log_5}(\cancel{5}^{-3}) = \boxed{-3}$

$\frac{1}{125} = 125^{-1} = (5^3)^{-1} = 5^{-3}$

$\log_2\left(\frac{1}{16}\right) = \log_2 2^{-4} = \boxed{-4}$

$\frac{1}{16} = 16^{-1} = 2^{-4}$

$\log_9 3 = \log_9 9^{1/2} = \boxed{1/2}$

$3 = 9^{1/2}$

Simplify: log 5 1 125