HPC REASSESSMENT Review for FIRST QUARTER

U1LT1 – Solving equations/inequalities with interval notation.

1. $2x^2 + 12x - 10 = x + 11$

$x = -7$ and $x = 1.5$

Graph both & find intersections

↖ write like this or $\{-7, 1.5\}$ fancy brackets

2. $\frac{|7+x|}{3} \geq 2$

$-2 \geq \frac{7+x}{3} > 2$

$-6 \geq 7 + x > 6$

$-13 \geq x > -1$

$(-\infty, -13] \cup (1, \infty)$

x is less than -13 and greater than -1

3. $\sqrt{2x+3} = |-x+5|$

$x = 2.258$

$x = 9.742$

Graph both & find intersections

U1LT2 Domain and Range MANDATORY

Graph Range.

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

Domain: $[4, \infty)$ Range: $[0, \infty)$

$x - 4 \geq 0$

$x \geq 4$

5. $f(x) = \frac{x+8}{4x^2-36}$

$4x^2 - 36 \neq 0$

$(2x-6)(2x+6) \neq 0$

$x \neq \pm 3$

$D: (-\infty, -3) \cup (-3, 3) \cup (3, \infty)$

$R: (-\infty, \infty)$

6. $f(x) = \frac{x}{x^2+5x+4}$

$x^2 + 5x + 4 \neq 0$

$(x+4)(x+1) \neq 0$

$x \neq -4, -1$

$D: (-\infty, -4) \cup (-4, -1) \cup (-1, \infty)$

$R: (-\infty, \infty)$

It does hit 0 at $x = 0$!

7. $f(x) = \frac{\sqrt{x+3}}{x^2+x-12}$

$x + 3 \geq 0$

$x \geq -3$

and $x^2 + x - 12 \neq 0$ so $x \neq -4, 3$

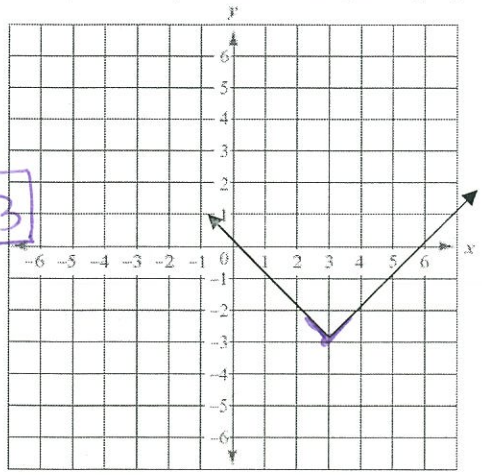
$D: (-3, 4) \cup (4, \infty)$

$R: [0, \infty)$

It does hit 0 at $x = -8$!

U1LT3 - **I can complete transformations on functions.** MANDATORY

8. What is the equation of the given graph?

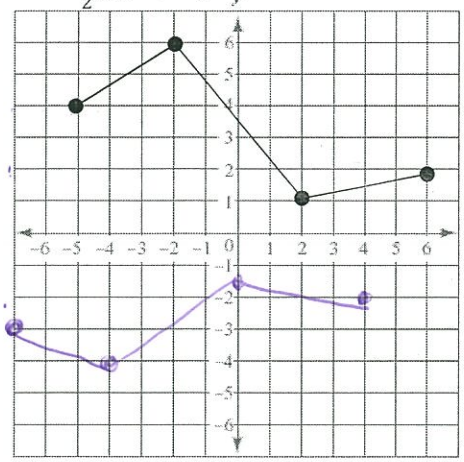


$y = |x|$

$y = |x-3|$

$y = |x-3| - 3$

9. The given graph is of $g(x)$. Sketch the graph of $-\frac{1}{2}g(x+2) - 1$



H: Left 2

S: Vertical $* \frac{1}{2}$

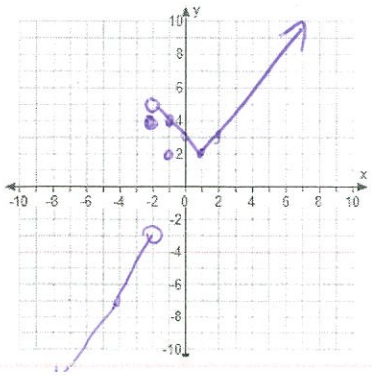
R: Reflect over x-axis

V: down 1

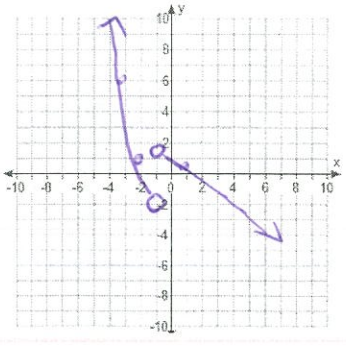
U1LT4 - **I can graph piecewise functions.**

10. $f(x) = \begin{cases} 2x + 1 \ for \ x < -2 \\ 4 \ for \ x = -2 \\ |x - 1| + 2 \ for \ x > -2 \end{cases}$

[Ignore the dot at $(-1, 2)$]



11. $g(x) = \begin{cases} x^2 - 3 \ for \ x < -1 \\ \frac{-x}{2} + 1 \ for \ x > -1 \end{cases}$



U1LT5 Composition of Functions AND OPERATONS $f+g$, $f-g$, fg, $\frac{f}{g}$

Evaluate the following given $f(x) = x^2 + 3$ $g(x) = 2x + 1$ $h(x) = \sqrt{x}$

12. $g(h(x)) =$

$2(\sqrt{x}) + 1 =$

$2\sqrt{x} + 1$

13. $g(f(x)) =$

$2(x^2+3) = \boxed{2x^2+6}$

Evaluate, and find the domain.

14. $f(h(x))$

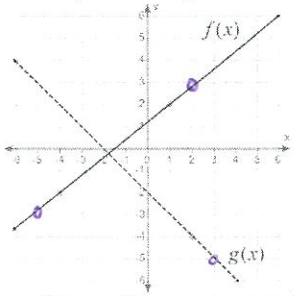
$(\sqrt{x})^2 + 3 = \boxed{x+3}$

D: $[0, \infty)$

(Restricted by $h(x)$)

Given the graph, evaluate the composition.

15. $f\big(g(f(2))\big) =$



$f(2) = 3$

$g(3) = -5$

$\boxed{f(-5) = -3}$

U1LT6 - I can determine if a function is even, odd, or neither. Show algebraically.

16. $f(x) = -2x^4 + 2x^2 - 4$ Even if $f(x) = f(-x)$ odd if $-f(x) = f(x)$

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

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

Neither

17. $g(x) = -4x^3 + 2x - 1$

$g(-x) = -4(-x)^3 + 2(-x) - 1$

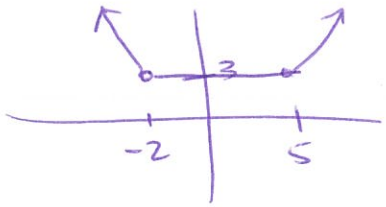
$g(-x) = 4x^3 - 2x - 1$

Neither

U2LT1 - I can find a functions relative and absolute maximum/minimums as well as intervals in increase, decrease, and consistency.

18. Graph $f(x) = |x - 5| + |x + 2| - 4$ on your calculator. Sketch the graph below and state intervals of increase, decrease, and consistency in interval notation.

Min ____ Max ____ Inc $(5, \infty)$ Dec $(-\infty, -2)$ Constant $(-2, 5)$



19. $f(x) = x^2 + 4x - 2$

Min -6 at $x = -2$ Max $\times$ Inc $(-2, \infty)$ Dec $(-\infty, -2)$ Constant ____

U2LT2 - I can identify if a function is continuous or not. I can state the type of discontinuity if one is found.

20. $f(x) = \frac{x^2-5x+4}{x-1}$

discontinuous

removable at $x = 1$

21. $f(x) = \begin{cases} 2x - 1 \text{ for } x < 1 \\ x^2 \text{ for } x \geq 1 \end{cases}$

Continuous

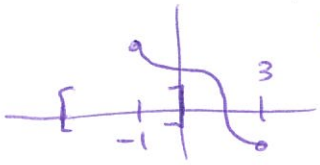
(they meet at the point $(1, 1)$)

22. $g(x) = \frac{x^2+8x+15}{x+4}$ $(x+3)(x+5)$

discontinuous

infinite disc. at $x=-4$

23. If a function is continuous and has points $f(-1) = 4$ and $f(3) = -2$, does it have any x intercepts on the interval $(-4,0)$? Why?



Maybe. It has an x-int between $x=-1$ and $x=3$ but maybe not in $(-4,0)$

U1LT3 End behavior MANDATORY

24. $f(x) = x^3 + 4x - 7x + 2$

$\lim_{x\to\infty} f(x) = \infty$ $\lim_{x\to-\infty} f(x) = -\infty$

25. $f(x) = \frac{3+4x}{5x-1}$

$\lim_{x\to\infty} f(x) = \frac{4}{5}$

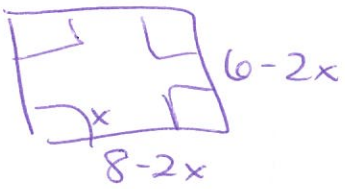
$\lim_{x\to-\infty} f(x) = \frac{4}{5}$

26. $f(x) = \frac{x+3}{x^2-4}$ $\lim_{x\to\infty} f(x) = 0$ $\lim_{x\to-\infty} f(x) = 0$

U2LT4 I can construct a model to represent and or investigate by finding max/minx and intervals of inc/dec. MANDATORY
Round to the nearest 100th if needed.

27. A sheet of cardboard 6 ft. by 8 ft. will be made into a box by cutting equal-sized squares from each corner and folding up the four edges. What size square need to be cut out of the box so the largest volume will be achieved?

$V = (8-2x)(6-2x)x$ Max of ~~24.25~~ at ~~x=1.19~~ $x=1.131$

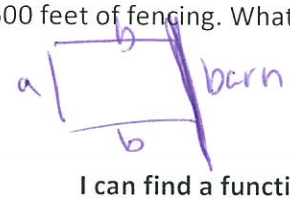


What will the size of the square be if the volume = 4 ft^3 ?

Graph $y=4$ over V graph

$x = 0.088$ or ~~$x=2.714$~~

28. Bob the Builder is building a rectangular garden that will be using the barn as the fourth side so no fencing is needed. Bob has 500 feet of fencing. What dimensions will maximize the total area of the garden?



$2b+a=500$

$a = 500-2b$

$\text{Area} = ab$

$= (500-2b)b$

Max of 31250 at $x=125$

Dim: 125 by 250

U2LT5 - I can find a function's inverse and verify if given functions are inverses or not.

Find the following functions' inverses. Please state the domain and range of both.

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

$x = \frac{y+4}{y-2}$

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

$xy-2x = y+4$

$xy-y = 2x+4$

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

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

D: $(-\infty,1)\cup(1,\infty)$

30. $f(x) = \sqrt{2x-3}$

$x = \sqrt{2y-3}$

$x^2+3 = 2y$

$y = \frac{x^2+3}{2}$

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

DCQ

Don't worry about domain

Confirm that the following are inverses.

31. $f(x) = \sqrt[4]{3x-4}$, $g(x) = \frac{1}{3}x^4 + \frac{4}{3}$

$f(g(x)) = \sqrt[4]{3(\frac{1}{3}x^4+\frac{4}{3})-4}$

$= \sqrt[4]{x^4+4-4}$

$= \sqrt[4]{x^4}$

$= x$

Because $f(g(x)) = x$ then they are inverses

U2LT6 I can find rate of change of a function.

33. $f(x) = -x^2 + 5x - 4$ [-3,4]

$\frac{f(4)-f(-3)}{4-(-3)} = \frac{0-(-21)}{7} = \boxed{3}$

34. $g(x) = \frac{x+4}{x-1}$ [-4,2]

$\frac{g(2)-g(-4)}{2-(-4)} = \frac{6-0}{6} = \boxed{1}$

35. $f(x) = 3x^2 + 1$

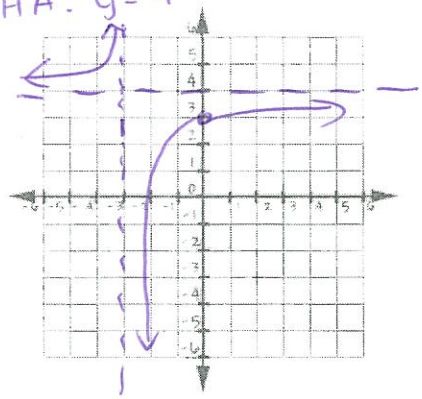
From [0,a] $\frac{f(a)-f(0)}{a-0} = \frac{3a^2+1-(0+1)}{a} = \frac{3a^2}{a} = \boxed{3a}$

From [a,c] $\frac{f(c)-f(a)}{c-a} = \frac{3c^2+1-3a^2-1}{c-a} = \frac{3c^2-3a^2}{c-a} = \frac{3(c^2-a^2)}{c-a} = \frac{3(c-a)(c+a)}{c-a} = \boxed{3(c-a)}$

U1LT7 Rational graphs

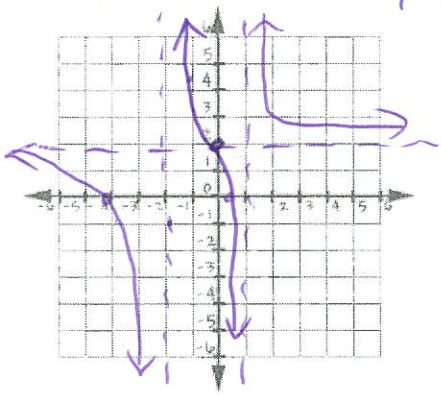
36. Graph $f(x) = \frac{4x+9}{x+3}$

Hole: N/A x-int: $(-\frac{9}{4}, 0)$
VA: $x=-3$ y-int: $(0,3)$
HA: $y=4$



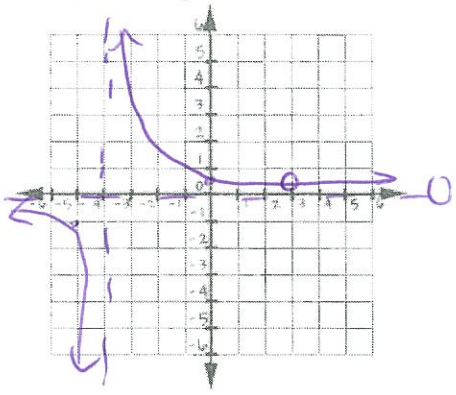
37. Graph $f(x) = \frac{2x^2+7x-4}{x^2+x-2}$ $\frac{(2x-1)(x+4)}{(x+2)(x-1)}$

Hole: N/A x-int: $\frac{1}{2}$ and -4
VA: $x=-2, x=1$ y-int: 2
HA: $y=2$



38. Graph $f(x) = \frac{(x-3)}{(x-3)(x+4)}$

Hole: $x=3$ x-int $\varnothing$
VA: $x=-4$ y-int $\frac{1}{4}$
HA: $y=0$



Write the equation given the following:

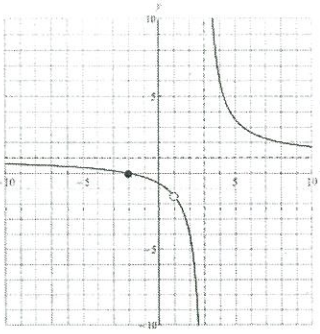
39. Hole at 4, x-intercept at 5, vertical asy at -1

$y = \frac{(x-4)(x-5)}{(x-4)(x+1)}$

40. Vertical asy at 3, horizontal asy at -2, x-int at 1

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

41.



Hole
$x=1$
HA
$y=1$
VA
$x=3$
x-int
$(-2,0)$

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