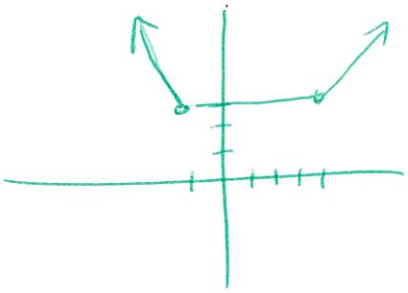
Unit 2 Assessment Review

U2LT1 - I can find a functions relative and absolute maximum/minimums as well as intervals of increase, decrease, and constant

1. Graph $f(x) = |x+1| + |x-4| - 2$ on your calculator. Sketch the graph below and state intervals of increase, decrease, and consistency in interval notation.



Increase: $(4, \infty)$

Decrease: $(-\infty, -1)$

Constant: $(-1, 4)$

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

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

Not continuous

hole at $x = -5$

removable discontinuity

3. $f(x) = \begin{cases} 13x \ for \ x < 1 \\ 5x^2 + 8 \ for \ x \geq 1 \end{cases}$

Continuous

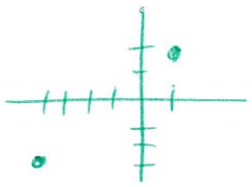
(the pieces come together at $(1, 13)$)

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

Not continuous

Infinite discontinuity at $x = -5$

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



Yes, there must be at least one x-intercept on $(-4,1)$ because the function must cross the x-axis to get from point to point.

U2LT3 – I can describe a function's end behavior using limits.

6. Find the end behavior of

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

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

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

7. Find the end behavior of

$h(x) = \frac{8x+1}{4x-3}$ degrees match.

$\lim_{x \to -\infty} h(x) = 2$

$\lim_{x \to \infty} h(x) = 2$

8. $f(x) = \frac{2x+1}{5x^2-3}$

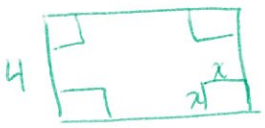
$\lim_{x \to -\infty} f(x) = 0$

$\lim_{x \to \infty} f(x) = 0$

U2LT4 – I can construct a model to represent and or investigate by finding max/mins and intervals of inc/dec

9. You have a 10 inch by 4 inch piece of cardboard. You are going to cut squares with sides x inches from the corners in order to fold up the sides to make a box with an open top.

a. What should the sides of the squares be in order to maximize the volume of the box? What is the volume of the box?



Height: x
Length: $10-2x$
Width: $4-2x$

Volume = LWH
Volume = $(10-2x)(4-2x)x$
Max of 16.243 at 0.58
(0.88, 16.243)

X needs to be 0.88 inches

b. What should the size of the squares be to make the volume of the box 10 in^3?

The points (0.317, 10) and (1.529, 10) apper on the graph.

X can be 0.317 or 1.529

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.

10. $f(x) = \frac{x-1}{x+2}$ D: $(-\infty,-2)\cup(-2,\infty)$ R:

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

$xy+2x = y-1$

$xy-y = -1-2x$

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

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

11. $f(x) = \sqrt{x+5}$

$x = \sqrt{y+5}$

$x^2 = y+5$

$y = x^2+5$

$f^{-1}(x) = x^2+5$

Confirm that the following are inverses by finding $f(g(x))$ and $g(f(x))$.

12. $f(x) = \sqrt[3]{5x+3}$, $g(x) = \frac{1}{5}x^3 - \frac{3}{5}$

$f(g(x)) = f\left(\frac{1}{5}x^3-\frac{3}{5}\right) = \sqrt[3]{5\left(\frac{1}{5}x^3-\frac{3}{5}\right)+3} = \sqrt[3]{x^3-3+3} = x$

$g(f(x)) = g\left(\sqrt[3]{5x+3}\right) = \frac{1}{5}\left(\sqrt[3]{5x+3}\right)^3 - \frac{3}{5} = \frac{5x+3}{5} - \frac{3}{5} = x$

U2LT6 – I can find the average rate of change of a function between two given values

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

13. Find the average rate of change of f from $x = -3$ and $x = 5$.

$\frac{f(5)-f(-3)}{5-(-3)} = \frac{10-(18)}{8} = \frac{-8}{8} = -1$

14. From x = a to x = c

$\frac{f(c)-f(a)}{c-a} = \frac{c^2-3c-(a^2-3a)}{c-a}$

$\Rightarrow \frac{c^2-3c-a^2+3a}{c-a}$

15. From x=0 to x = a

$\frac{f(a)-f(0)}{a-0} = \frac{a^2-3a-0}{a} = \frac{a(a-3)}{a}$

$\Rightarrow a-3$

$\Rightarrow a^2-a^2+3a+3a$

U2LT7 – I can graph/write rational graphs.

Graph the following:

16. $f(x) = \frac{(x+4)(x-6)}{(x+4)(x-2)(x+1)}$

x	y
1	$\frac{15}{12}$

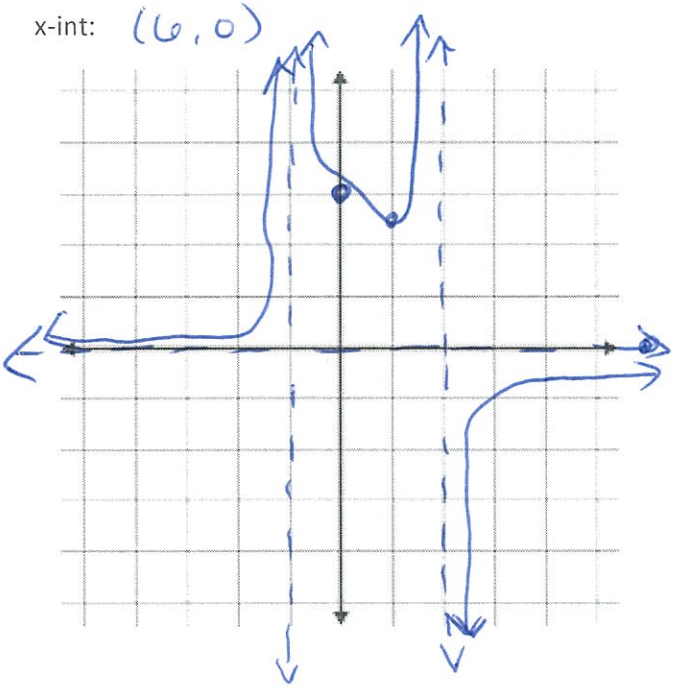
Hor. Asym: $y = 0$

Y-int: $(0, 3)$

Holes: $x = -4$

Vert Asym: $x = 2$, $x = -1$

x-int: $(6, 0)$



17. $f(x) = \frac{x^2+4x+3}{3(x+1)(x-2)} = \frac{(x+3)(x+1)}{3(x+1)(x\neq -2)}$

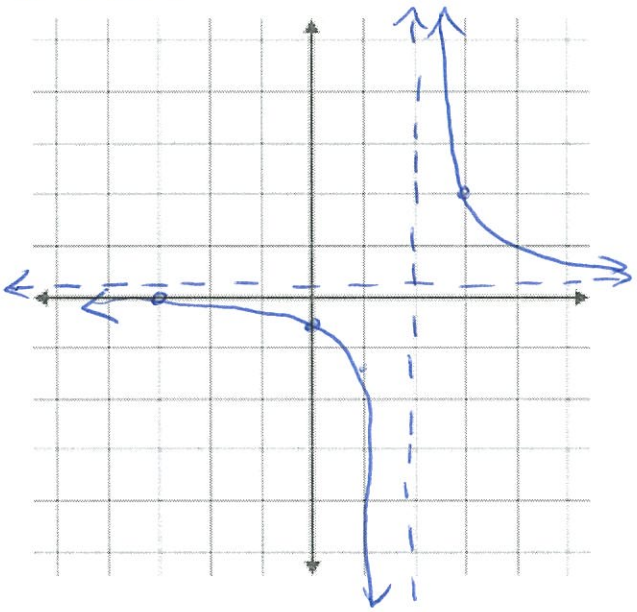
Hor. Asym: $y = \frac{1}{3}$

Y-int: $(0, -1/2)$

Holes: $x = -1$

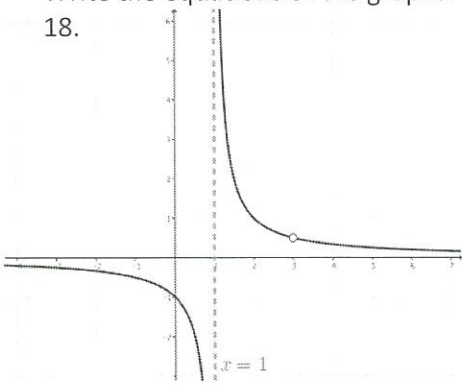
Vert. Asym: $x = 2$

x-int: $(-3, 0)$



Write the equations of the graphs.

18.



Hole at $x=3$

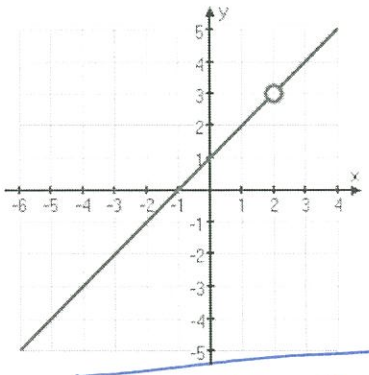
VA: $x = 1$

HA: $y = 0$

y-int $(0, -1)$

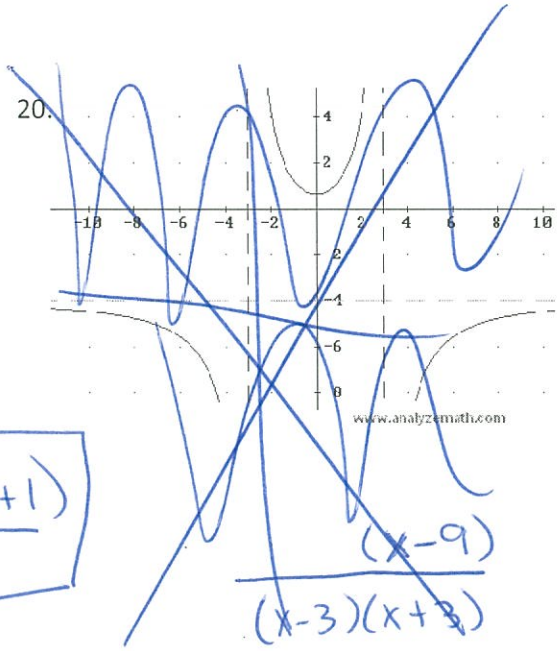
$f(x) = \frac{(x-3)(x+1)}{(x-3)(x-1)}$

19.



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

20.



$\frac{(x-9)}{(x-3)(x+3)}$

Don't Do