Fill in the blanks with the most appropriate answer.   (3 points each)

(1) Simplify: $\dfrac{13x^4 y^3}{26x^{-3} y^8}$ _____

(2) Simplify $\left(3+\sqrt{x}\right)\left(3-\sqrt{x}\right)$ _____

(3) Simplify completely: $\left(-3x^{1/3} y^{-1}\right)\left(11x^{1/2} y^4\right)$ _____

(4) If $f(x)=|x|+x$, what does $f(x)$ simplify to when x < 0?

_____

(5) If $f(x)=\sqrt{x}$, find $f(x+h)$ _____

(6)   Simplify. $\dfrac{2x}{x+5}+\dfrac{6}{x^2-2x-35}$ _____

(7) Factor. $10x^2+17x+3$ _____

(8) The slope of a line parallel to the line 5x+4y=7 is   _____

(9) Factor x^3-8 _____

(10)   Simplify $\dfrac{2x^2}{3x^2+5xy}$ _____

T   F   (11) If $\sqrt{64} = \pm 8$

T   F   (12) $\left(\dfrac{5x}{z^3}\right)^{-3} = \dfrac{z^9}{125x^3}$

T   F   (13) $(x-y)^2 = (x-y)(x+y)$

T   F   (14) $\sqrt{x^4+9} = x^2+3$

T   F   (15) $\sqrt{x^2} = x$ for all x

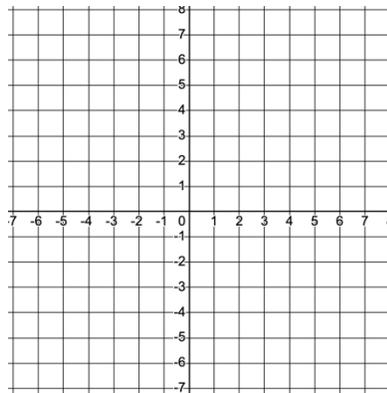(16) Find the equation of the line containing the points (5,1) and (-3,2)

(10 points)

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(17) Find the domain for each of the following functions. Express answer as interval.

(5 points each)

(a) f(x) $= \sqrt{x+1}$

(b) g(x) $= \dfrac{x}{x^2+7x+10}$

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(18) Graph $\begin{cases} 2x+1 & if\ \ x\le 0 \\ |x-3| & if\ \ x>0 \end{cases}$ Label 2 points on graph.   (10 points)

(19) Given $f(x) = x^2$, find $f(2a) - 2f(a)$ (6 points)

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(20) Factor Completely: (6 points each)

(a) $12x^{1/3} - 3x^{7/3}$

(b) $3\left(x^2 + 4\right)^2 2x(x+5)^6 + \left(x^2 + 4\right)^3 6(x+5)^5$

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(21) Simplify: (6 points each)

(a) $\dfrac{2\sqrt{3+x} - \dfrac{2x}{\sqrt{3+x}}}{3+x}$

(b) $\dfrac{a^{-2} - b^{-2}}{b - a}$

(22). Find all the solutions of the following and simplify: (9 points each)
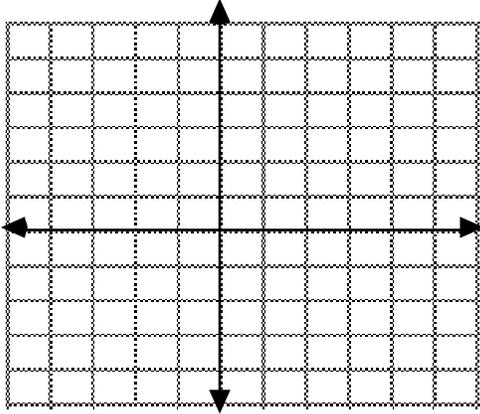
(a) $3x^2 + x - 1 = 0$

(b) $x^2 - x - 30 \leq 0$

(c) $\sqrt{x} - \sqrt{x - 3} = 1$

(d) $x^4 - 7x + 12 = 0$

(23) Given the function $f(x) = \frac{1}{2}x^2 + 4x + 6$ (8 points)

put f(x) in the form f(x) = a(x-h)² + k and sketch the graph. On the graph label the vertex plus one other point.

(24) Given the graph of $y = f(x)$ (16 points)

(a) Express answers using interval notation:
-make it clear if you are using (vs. [

$(-4, 5)$

Domain of $f(x)$?_____

Range of $f(x)$?_____.
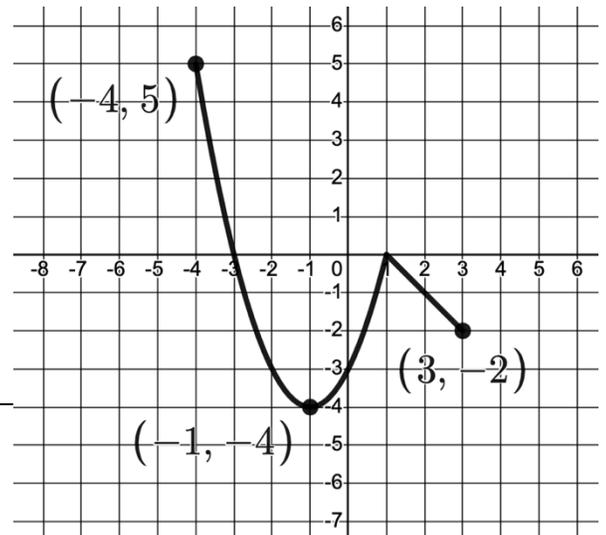
Where is $f(x)$ decreasing ?_____

(b) Find the coordinates of local max(s), if any_____
(recall, local extrema do not occur at endpoints)

$(-1, -4)$

$(3, -2)$

(c) What is the value of $f(2)$?_____

(d) Find a value of a for which $f(a) = 5$_____

(e) What are the y intercept(s) (if any)_____

(f) On the axes given, graph $y = -f(x-1)$

(25) Find the inverse of $f(x) = \dfrac{5x}{x-1}$. What is the domain and the range of $f(x)$? (10 points)

(26) Given the polynomial , $f(x) = x^3 - 3x^2 + 4$ (12 points)

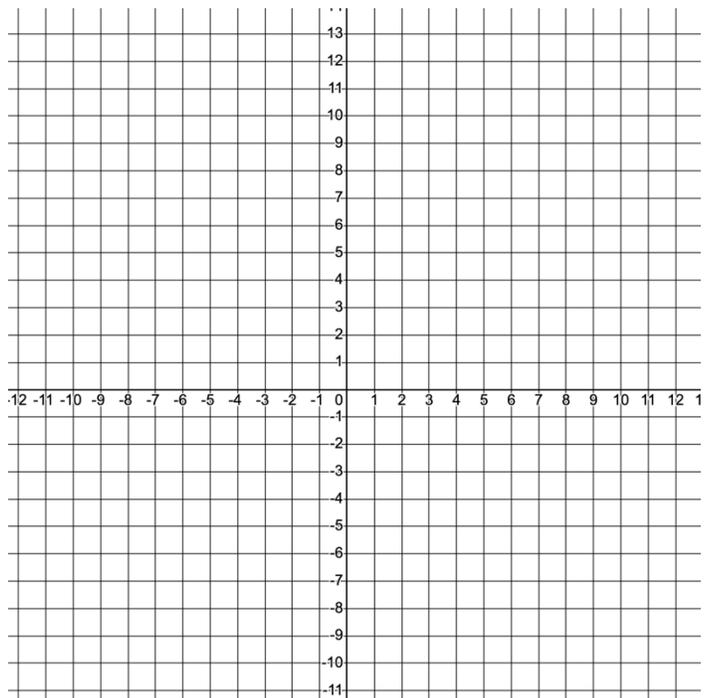(a) find end behavior   _____

(b) find the y intercept   _____

(c) find the list of possible rational zeros of f(x)   _____

(d) find the x intercepts and discuss the behavior near them.

_____

(e) plot one additional point for accuracy and sketch the graph. Label two points

SHOW ALL WORK

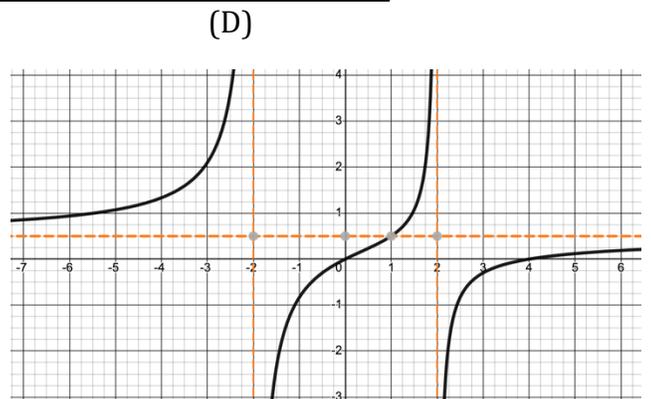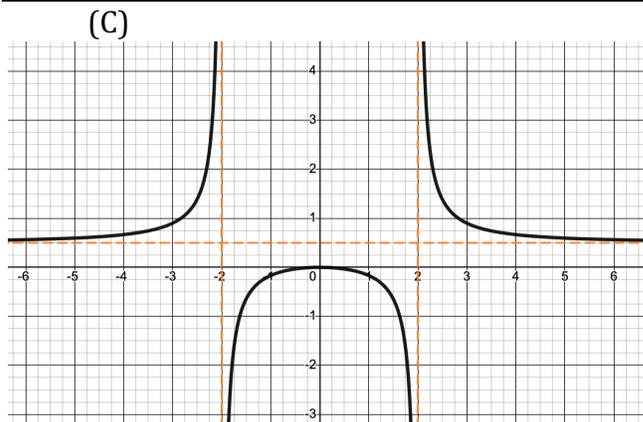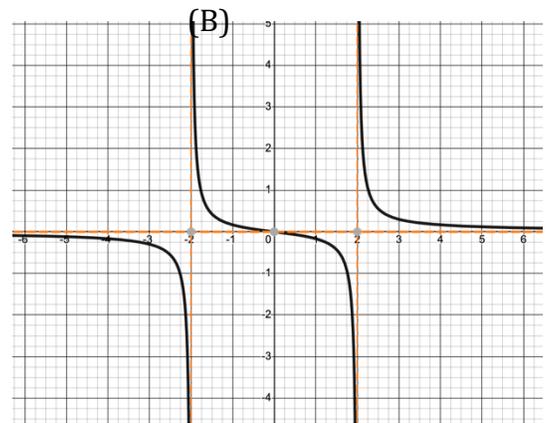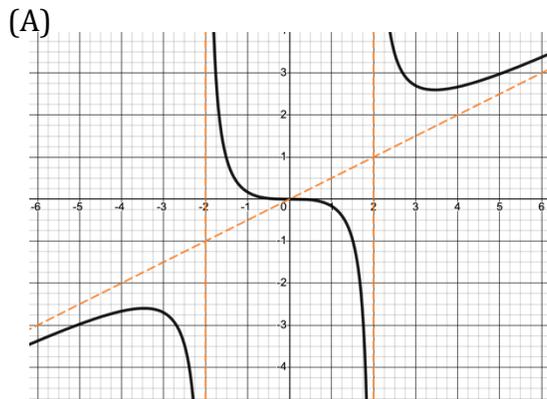(27) Match the function to its graph: (8 points)

a) $f(x) = \dfrac{x}{2x^2 - 8}$ _____

b) $f(x) = \dfrac{x^3}{2x^2 - 8}$ _____

c) $f(x) = \dfrac{x^2}{2x^2 - 8}$ _____

d) $f(x) = \dfrac{x(x-4)}{2x^2 - 8}$ _____

(A)

(B)

(C)

(D)

(28)   A long, rectangular sheet of metal 12 inches wide is to be made into a rain gutter by turning up two sides so that they are perpendicular to the sheet. How many inches should be turned up to give the gutter the greatest capacity. (Let x be the length of the sides turned up)

(10 points)

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