Find the 4th term of $(2x-y)^{12}$.

the $(k+1)^{st}$ term of $(a+b)^n$ is $\binom{n}{k}a^{n-k}b^k$

$a=2x,\ b=-y,\ n=12,\ k=3$

$\binom{12}{3}(2x)^{12-3}(-y)^3$

$\frac{12!}{3!(12-3)!}(2x)^9(-y)^3 =$

$= \frac{12\cdot 11\cdot 10\cdot 9!}{3\cdot 2\cdot 9!}\cdot(-2^9)x^9y^3$

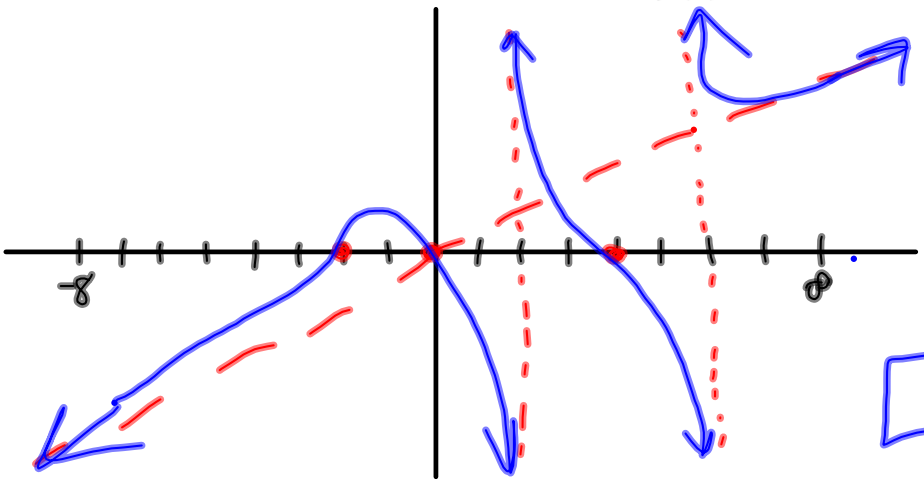
$= -2^{10}(110)x^9y^3 = \boxed{-112{,}640x^9y^3}$

Given the rational function

$$f(x)=\frac{x(x-4)(x+2)}{(x-2)(x-6)}=\frac{x^3-2x^2-8x}{x^2-8x+12}$$

end behavior: $\frac{x^3}{x^2}=x$

1. Determine the zeros of the function. $0, 4, -2$
2. Determine the y-intercept of the function. $(0,0)$
3. Determine the equations of any vertical asymptotes of the function. $x=2, x=6$
4. Determine the equations of any horizontal or oblique asymptotes. $y=x$
5. Graph the function.
6. Determine the interval notation solution of $f(x)\le 0$.



$(-\infty,-2] \cup [0,2) \cup [4,6)$

Write an equation for $y = \sqrt[3]{x}$, but flipped vertically, stretched vertically by a factor of 4, shifted down 5, and shifted right 2.

$y = -4\sqrt[3]{x-2} - 5$

Determine whether the function is even, odd, or neither.

$f(x) = -5x^2 + \frac{3}{x^4} - 7$

$f(-x) = -5(-x)^2 + \frac{3}{(-x)^4} - 7$

$= -5x^2 + \frac{3}{x^4} - 7 = f(x)$

For the functions $f(x) = \frac{1}{x}$ and $g(x) = \sqrt{x-3}$,

1. find $(f \circ g)(x)$

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

2. give the domain of $(f \circ g)(x)$

$x-3 > 0$

$x > 3$

$\{x \mid x > 3\}$ or $(3, \infty)$

3. find $(g \circ f)(x)$

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

4. give the domain of $(g \circ f)(x)$

$\frac{1}{x} - 3 \geq 0$

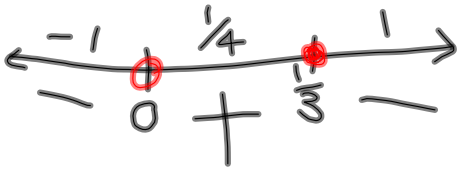
$\frac{1-3x}{x} \geq 0$

zero: $1-3x = 0$

$1 = 3x$

$\frac{1}{3} = x$

V.A. $x = 0$



$(0, \frac{1}{3}]$

Write a slop-intercept equation ($y = mx + b$) for a line passing through the given point that is perpendicular to the given line.

$(3, 5)$, ~~$y = \frac{2}{7}x + 1$~~

$m = -\frac{7}{2}$ (x_1, y_1)

$y - y_1 = m(x - x_1)$

$y - 5 = -\frac{7}{2}(x - 3)$

$y = -\frac{7}{2}x + \frac{21}{2} + \frac{10}{2}$

$y = -\frac{7}{2}x + \frac{31}{2}$

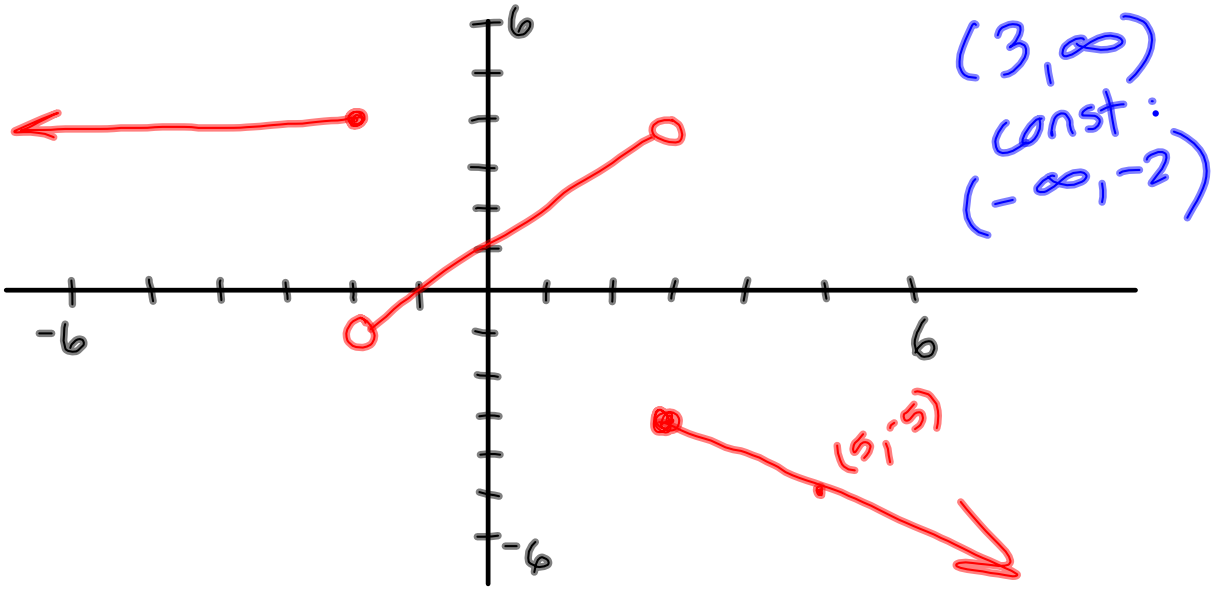
Graph the following piecewise function by hand, and state on which intervals f is increasing, decreasing, and constant.

$$f(x) = \begin{cases} 4, & for\ x \le -2 \\ x + 1, & for\ -2 < x < 3 \\ -x, & for\ x \ge 3 \end{cases}$$

incr: $(-2, 3)$

decr: $(3, \infty)$

const: $(-\infty, -2)$



Solve for x.

1. $5^{4x-7} = 125$

$5^{4x-7} = 5^3$

$4x-7 = 3$

$4x = 10$

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

2. $\log x + \log(x+4) = \log 12$

$\log[x(x+4)] = \log 12$

$x(x+4) = 12$

$x^2+4x-12 = 0$

$(x+6)(x-2) = 0$

~~$x = -6$~~, $x = 2$

Construct and simplify the difference quotient for $f(x) = 5x^2 + 3x$.

$$\frac{f(x+h)-f(x)}{h}$$

$$\frac{5(x+h)^2+3(x+h)-(5x^2+3x)}{h}$$

$$= \frac{5(x^2+2xh+h^2)+3x+3h-5x^2-3x}{h}$$

$$= \frac{5x^2+10xh+5h^2+3x+3h-5x^2-3x}{h}$$

$$= \frac{h(10x+5h+3)}{h}$$

$$= 10x+5h+3$$

For the graph of the function $f(x) = -4x^2 + 24x - 20$

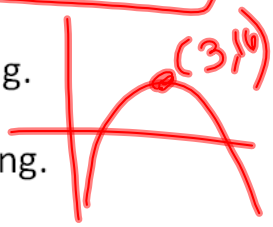
a. Find the vertex. $\frac{-b}{2a} = \frac{-24}{2(-4)} = \frac{-24}{-8} = 3$ $-36+72-20 = 16$ $(3, 16)$

$(\frac{-b}{2a}, f(\frac{-b}{2a}))$ $f(3) = -4(9) + 24(3) - 20$

b. State the equation of the axis of symmetry. $x = 3$

c. State the interval(s) on which the function is increasing. $(-\infty, 3)$

d. State the interval(s) on which the function is decreasing. $(3, \infty)$



e. State the y-intercept as an ordered pair. $(0, -20)$

f. State the x-intercept(s) (if any) as ordered pairs. $(5,0)$ & $(1,0)$

$-4x^2 + 24x - 20 = 0$

$-4(x^2 - 6x + 5) = 0$

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

Find the sum of the geometric series, if it exists. Give an exact answer.

$-8 + 4 + (-2) + \cdots$

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

$S_\infty = \frac{a_1}{1-r} = \frac{-8}{1-(-\frac{1}{2})} = \frac{-8}{1+\frac{1}{2}} = \frac{-8}{\frac{3}{2}} = -8 \cdot \frac{2}{3} = -\frac{16}{3}$

Given a set with 9 elements, how many ways are there to choose 5 of them?

$\binom{9}{5} = \frac{9!}{5!(9-5)!} = \frac{9 \cdot 8 \cdot 7 \cdot 6 \cdot 5!}{5! \cdot 4 \cdot 3 \cdot 2}$

3 14
9
126

126

Homework to turn in Friday:
10.1 #59,63,67
10.2 #9,15,19,21,25,29
10.2 #35,57
10.3 #15,19,21,25,35,37,43,45,49,57
10.7 #1,7,21,27,31-39 odd

Also due Friday: Take-home quiz #10