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

$a: 2x$
$b: -y$
$n: 12$
$k: 3$

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

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

$\frac{12!}{3!(12-3)!}(2x)^9(-y)^3 = \frac{12\cdot 11\cdot 10\cdot 9!}{3\cdot 2\cdot 9!}\cdot 2^9(-1)x^9y^3$

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

10.7

39. $(\sqrt{2}-i)^4$

$i^2=-1$

$(-i)^2=(-1)^2\cdot(i^2)$
$=1\cdot(-1)$

$(-i)^4=i(-i)$
$=-i^2=-(-1)=1$

$(-i)^3=(-1)\cdot(-i)$

$1(\sqrt{2})^4\cdot 1 + 4(\sqrt{2})^3(-i) + 6(\sqrt{2})^2(-i)^2 + 4(\sqrt{2})(-i)^3 + 1\cdot(-i)^4$

$4 + (-8i\sqrt{2}) - 12 + 4i\sqrt{2} + 1$

$-7-4i\sqrt{2}$

35. $(x^5+3)^4$ degree? 20

$(x^5)^4 + \ldots$

$x^5 + x^4y + x^3y^2 + \ldots$

$(x^3+y^7)^5$

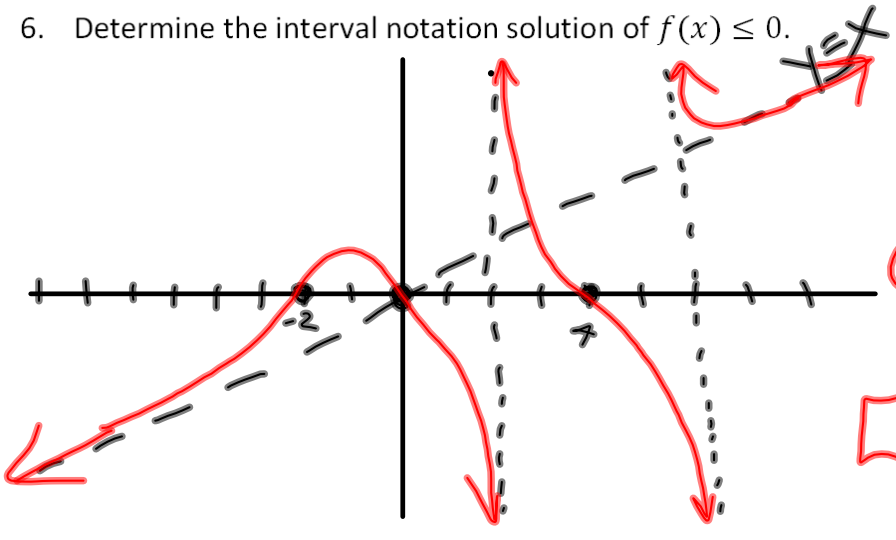
$(x^3)^5 + (x^3)^4(y^7) + (x^3)^3(y^7)^2 + \ldots (y^7)^5$

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 $f(x) \leq 0$.



$f(x) \leq 0$

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

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 $(f \circ g)(x)$

$x-3 > 0$

$x > 3$ $\{x|x>3\}$ $(3,\infty)$

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

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

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

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

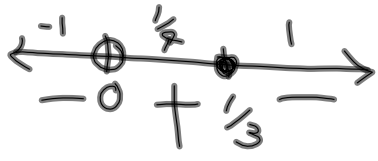
$\frac{1-3x}{x} \geq 0$

$1-3x = 0$

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

$x = 1/3$ (zero)

$x = 0$ V.A.



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

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

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

(x_1, y_1)

$m = -\frac{7}{2}$

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

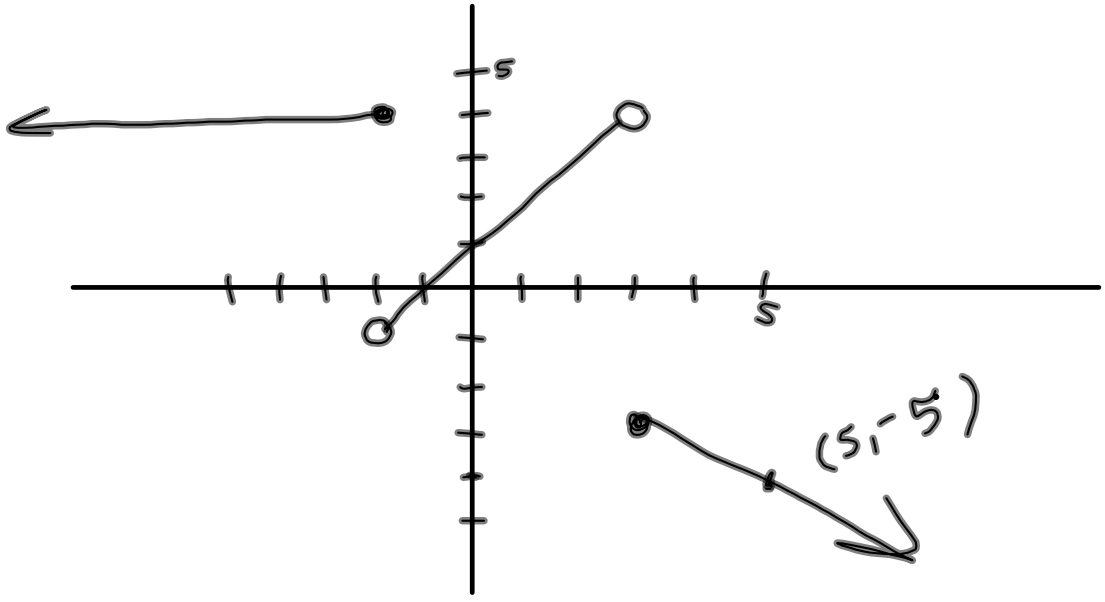
$y - 5 = -\frac{7}{2}(x - 3)$

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

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

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

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



Solve for x.

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

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

$4x-7 = 3$

$4x = 10$

$x = 5/2$

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. $\frac{b}{2a} = \frac{-24}{2(-4)} = \frac{-24}{-8} = 3$ $f(3) = -4(9) + 24(3) - 20$ $= -36 + 72 - 20$ $= 16$ $(-\frac{b}{2a}, f(-\frac{b}{2a}))$ $(3, 16)$

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.

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

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

$x^2 - 6x + 5 = 0$

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

$x = 5, 1$

$(5, 0)$ & $(1, 0)$

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?

$\binom{9}{5} = \frac{9!}{5!(9-5)!}$

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

$= 9 \cdot 7 \cdot 2 = 126$

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