

Math 112(Homework #9

Section 5.3 # 38/44

Section 5.4 # 6/10

Section 6.1 # 53/57

Section 7.1 # 15/19

5.3 # 38/44

$$f(x) = -x^3 - 12x^2 - 45x + 2$$

$$f'(x) = -3x^2 - 24x - 45$$

$$f''(x) = -6x - 24$$

$$f' = 0 : -6x - 24 = 0$$

$$-6x = 24$$

$$x = -4$$

$$f'' \quad \begin{array}{c} -4 \\ \hline + \quad 0 \quad - \end{array}$$

$$f''(-5) = -6 \cdot -5 - 24 = 30 - 24 = 6$$

$$f''(0) = -6 \cdot 0 - 24 = -24$$

Concave up on $(-\infty, -4)$

down on $(-4, \infty)$

5.4 #6/10

$$f(x) = x^3 - 6x^2 + 12x - 11$$

$$f'(x) = 3x^2 - 12x + 12$$

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

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

$$\begin{array}{c} 2 \\ \hline | \end{array}$$

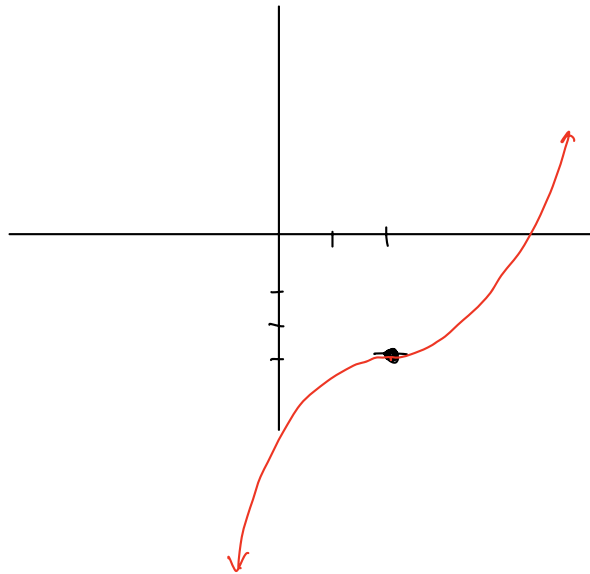
$$f' \quad + \quad 0 \quad +$$

$$f'(0) = 3(0-2)^2 = +$$

$$f'(3) = 3(3-2)^2 = +$$

$$f' = 0: \quad x = 2$$

$$x = 2, \quad y = f(2) = 2^3 - 6 \cdot 2^2 + 12 \cdot 2 - 11 = -3$$



6.1 #53/57

$$f(x) = \frac{x^2 + 36}{2x}$$

on $[1, 12]$

$$f'(x) = \frac{2x \cdot 2x - (x^2 + 36) \cdot 2}{(2x)^2}$$

$$= \frac{4x^2 - 2x^2 - 72}{4x^2} = \frac{2x^2 - 72}{4x^2} = \frac{x^2 - 36}{2x^2}$$

$$f' = 0: \quad \frac{x^2 - 36}{2x^2} = 0$$

$$x^2 - 36 = 0$$

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

$$x = 6, -6$$

x	f(x)
1	18.5
12	7.5
6	6 ← <u>min</u>
9	

The selenium is at a minimum at $x=6$,
and its minimum % is 6% .

7.1 # 15/19

$$\int 5x(x^2 - 8) dx = \int 5x^3 - 40x dx$$

$$= 5 \cdot \frac{1}{4} x^4 - 40 \cdot \frac{1}{2} x^2 + C$$