

Math 1121

Homework #21

#41, 61

#41 $f(x) = x(x+5)^2 = x(x^2 + 10x + 25)$
 $= x^3 + 10x^2 + 25x$

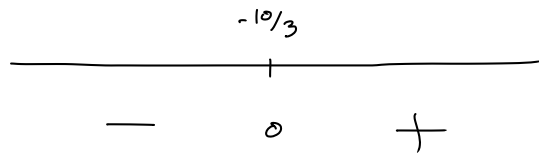
$$f'(x) = 3x^2 + 20x + 25$$

$$f''(x) = 6x + 20$$

f'=0 $6x + 20 = 0$

$$x = \frac{-20}{6} = -\frac{10}{3}$$

f''



$$f''(0) = 6 \cdot 0 + 20 = 20$$

$$f''(-10) = 6 \cdot (-10) + 20 = -40$$

f is concave down on $(-\infty, -10/3)$
concave up on $(-10/3, \infty)$

#61

$$f(x) = 3x^3 - 3x^2 + 1$$

$$f'(x) = 9x^2 - 6x$$

$$f''(x) = 18x - 6$$

f'=0 $9x^2 - 6x = 0$

$$3x(3x - 2) = 0$$

$$x = 0, \quad x = 2/3$$

$$f''(0) = 18 \cdot 0 - 6 = -6 \quad \text{so } \underline{x=0 \text{ is a rel. max}}$$

$$f''(2/3) = 18 \cdot 2/3 - 6 = 12 - 6 = 6 \quad \text{so } \underline{x=2/3 \text{ is a rel. min}}$$