125 HW #9

4.3 9c, 18, 20, , 28

4.3 #9c $f(x) = 2x^3 + 3x^2 - 36x$

Find intervals of concavity

$f'(x) = 6x^2 + 6x - 36$

$f''(x) = 12x + 6$

$12x + 6 = 0$

$x = -1/2$

$f'(0) = 6$

$f'(-1) = -6$

So f is concave up on $(-1/2, \infty)$

down on $(-\infty, -1/2)$

$-1/2$ is an inflection pt.

4.3 #17a,c a. $f(x) = x^4(x-1)^3$

$f'(x) = 4x^3(x-1)^3 + x^4 \cdot 3(x-1)^2$

$0 = 4x^3(x-1)^3 + x^4 \cdot 3(x-1)^2$

$0 = x^3(x-1)^2\left(4(x-1) + 3x\right)$

$x = 0$ or $x - 1 = 0$ or $4(x-1) + 3x = 0$

$7x - 4 = 0$

$x = 4/7$

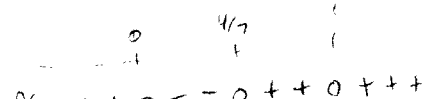
$x = 0 \qquad x = 1$

Crit pts: 0, 1, 4/7.

c. $f'(-1) > 0 \qquad f'(.3) > 0$

$f'(1/2) < 0$

$f'(2) > 0$

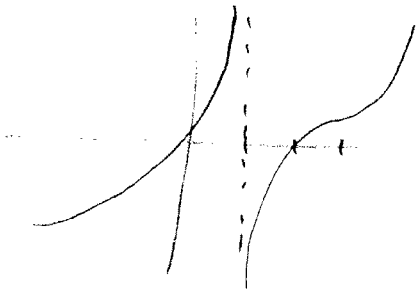


$f(0)$ a loc min

$f(4/7)$ min

$f(1)$ not a loc extremum

4.3 #20 (many answers possible)



4.3 #28

a. f is inc on $(1,6)$, $(8,9)$

b. local maxs: 6

local mins: 1, 8

c. f conc up on $(0,2)$, $(3,5)$, $(7,9)$

f conc dn on $(2,3)$, $(5,7)$

d. $x = 2, 3, 5, 7$