Math 16A (Summer 2008)
Kouba
Quiz 3

PRINT Name : _____ KEY _____

Exam ID # : _____

1.) (10 pts.) Use $f'(x) = \lim\limits_{h \to} \dfrac{f(x+h) - f(x)}{h}$ to find the derivative of $f(x) = 2x^2 - 3x + 4$.

$$f'(x) = \lim_{h \to 0} \frac{2(x+h)^2 - 3(x+h) + 4 - (2x^2 - 3x + 4)}{h}$$

$$= \lim_{h \to 0} \frac{2(x^2 + 2hx + h^2) - 3x - 3h + 4 - 2x^2 + 3x - 4}{h}$$

$$= \lim_{h \to 0} \frac{2x^2 + 4hx + 2h^2 - 3h - 2x^2}{h}$$

$$= \lim_{h \to 0} \frac{h(4x + 2h - 3)}{h} = 4x - 3$$

2.) (5 pts. each) Use shortcut rules (but not product or quotient rule) to find the derivatives of each function.

a.) $y = 3x + 7 \quad \xrightarrow{D} \quad y' = 3$

b.) $f(x) = x^4 + x^{-2} - x^{3/4} \quad \xrightarrow{D} \quad f'(x) = 4x^3 - 2x^{-3} - \frac{3}{4}x^{-1/4}$

c.) $y = \dfrac{(x-3)^2}{x} = \dfrac{x^2 - 6x + 9}{x} = x - 6 + 9 \cdot x^{-1} \xrightarrow{D}$

$$y' = 1 - 0 - 9x^{-2}$$

d.) $g(x) = (2-x)(3x+7) = 6x - 3x^2 + 14 - 7x$

$$= -3x^2 - x + 14$$

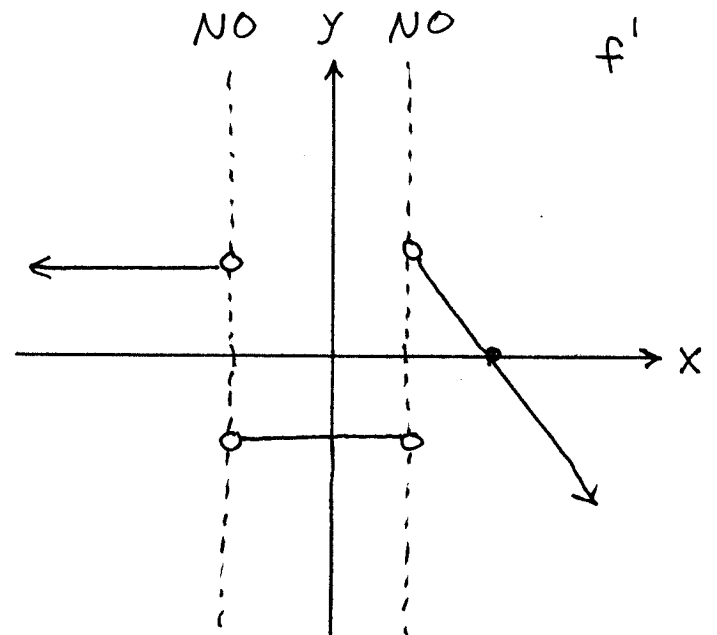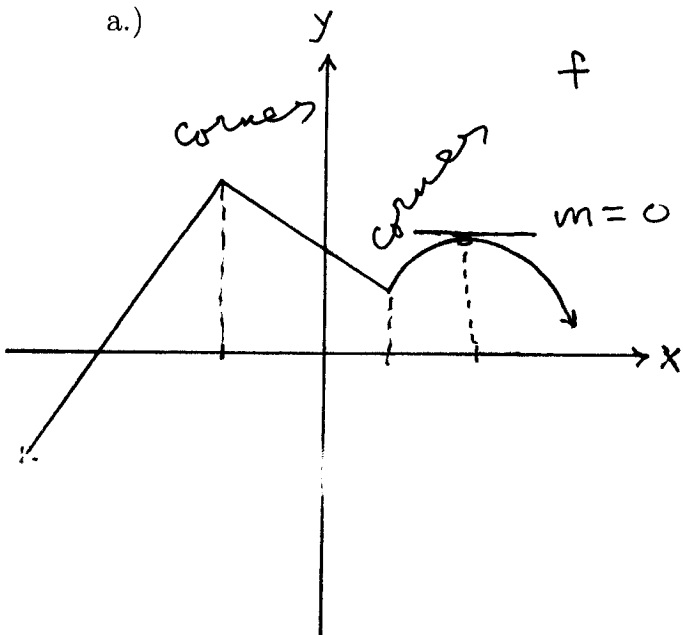$$\xrightarrow{D} \quad g'(x) = -6x - 1$$

2

3.) (6 pts.) Find an equation of the line tangent to the graph of $f(x) = x^2 - x + 1$ at the point $x = 2$.

$f'(x) = 2x - 1$ so slope $m = f'(2) = 3$

and $x = 2$, $y = 3$ so line is

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

4.) (7 pts. each) Use the graph of f to draw a rough sketch of the graph of its derivative f'.

a.)

corner

corner

$m = 0$

f

NO y NO

f'

b.)

$m = 0$

$m = 0$

f

y

f'

3