Math 16A (Summer 2008)
Kouba
Quiz 4

PRINT Name : KEY

Exam ID # : ----------

1.) (5 pts. each) Use shortcut rules to find the derivatives of each function. Do not simplify answers.

a.) $y = x^3 \tan x$

$\xrightarrow{D}$ $y' = x^3 \cdot \sec^2 x + 3x^2 \cdot \tan x$

b.) $f(x) = (7x - 4)^{2/3}$

$\xrightarrow{D}$ $f'(x) = \frac{2}{3}(7x-4)^{-1/3} \cdot (7)$

c.) $y = \dfrac{x^2 - 5x}{\sec x}$

$\xrightarrow{D}$ $y' = \dfrac{\sec x \cdot (2x-5) - (x^2-5x) \cdot \sec x \tan x}{(\sec x)^2}$

d.) $y = \left(\dfrac{x+4}{3-2x}\right)^5$

$\xrightarrow{D}$ $y' = 5\left(\dfrac{x+4}{3-2x}\right)^4 \cdot \dfrac{(3-2x)(1) - (x+4)(-2)}{(3-2x)^2}$

e.) $g(x) = 5 + 4\cos(x^2)$

$\xrightarrow{D}$ $g'(x) = 4 \cdot -\sin(x^2) \cdot 2x$

f.) $g(x) = \sin^3(\cos(4x))$ (order: $()^3$, sin, cos, $4x$)

$\xrightarrow{D}$ $g'(x) = 3\sin^2(\cos(4x)) \cdot \cos(\cos(4x)) \cdot -\sin(4x) \cdot 4$

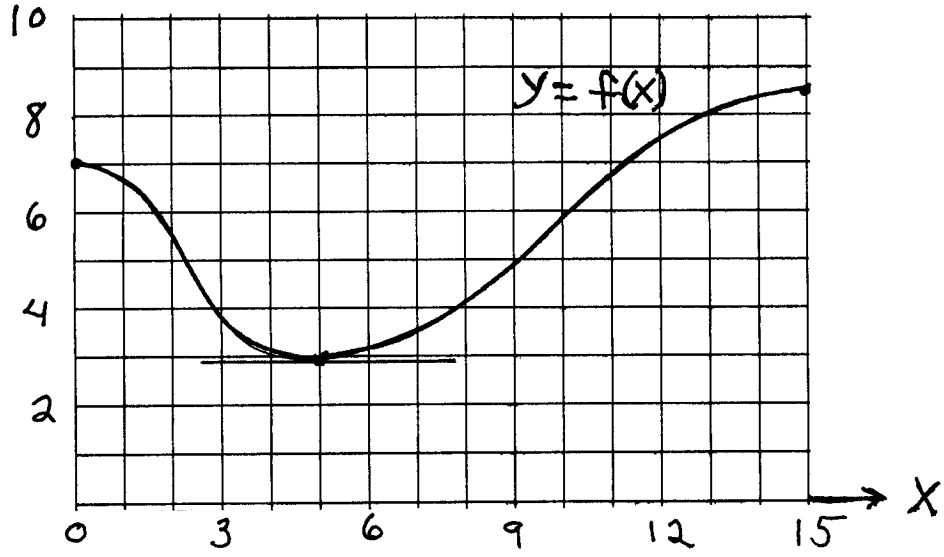
3.) (10 pts.) Assume that $f(x) = x(4-x)^3$. Solve $f'(x) = 0$ for x.

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

$= (4-x)^2 \cdot [-3x + (4-x)]$

$= (4-x)^2 \cdot [4-4x] = 0 \longrightarrow x = 4,\ x = 1$

4.) (5 pts. each) Use the given graph of f to estimate each of the following.



a.) the Average Rate of Change (ARC) for f on the interval $[0, 9]$

$ARC = \dfrac{f(9) - f(0)}{9-0} \approx \dfrac{5-7}{9} = \dfrac{-2}{9}$

b.) the Average Rate of Change (ARC) for f on the interval $[5, 13]$

$ARC = \dfrac{f(13) - f(5)}{13-5} \approx \dfrac{8-3}{8} = \dfrac{5}{8}$

c.) the Instantaneous Rate of Change (IRC) for f at $x = 5$

$IRC \approx 0$ (slope of tangent line)