September 30, 2011

Last Name: SOLUTIONS.

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Student ID: _____

Quiz 5 (B)

Question 1. *(10 marks)* Let $f(x) = f(x) = 2x^2 + 1$

(a) Find the derivative of f.

(b) Find the point on the graph where the tangent line to the curve is horizointal.

(c) Find the equation of the tangent line to the curve at $x = 1$

a) $f'(x) = \lim_{h\to 0} \frac{f(x+h) - f(x)}{h} = \lim_{h\to 0} \frac{[2(x+h)^2+1] - [2x^2+1]}{h}$

$= \lim_{h\to 0} \frac{2(x^2+2xh+h^2) + 1 - 2x^2 - 1}{h} = \lim_{h\to 0} \frac{2x^2+4xh+2h^2-2x^2}{h}$

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

b) $f'(x) = 4x = 0 \Rightarrow x = 0$

$\therefore f(0) = 2(0)^2 + 1 = 1 \quad \therefore (0,1)$

c) $f'(1) = 4(1) = 4 = m$

$f(1) = 2(1)^2 + 1 = 3 = y$

$\therefore y = mx + b$

$3 = 4(1) + b$

$-1 = b$

$\therefore y = 4x + 1$