Mathematics 122

Quiz #16 Name: Key

You must show your work to get full credit.

(1) Let a be a constant. Find the equation of the tangent line to $y = \sqrt{x}$ at the point where $x = b^2$.

2pts

$x_0 = b^2$

$y_0 = \sqrt{x_0} = \sqrt{b^2} = b$

$y' = (x^{\frac{1}{2}})' = \frac{1}{2} x^{-\frac{1}{2}}$

$m = y'(x_0) = \frac{1}{2}(b^2)^{-\frac{1}{2}} = \frac{1}{2b}$

$y - y_0 = m(x - x_0)$

becomes $y - b = \frac{1}{2b}(x - b^2)$

$y - b = \frac{1}{2b}(x - b^2)$

or $y = b + \frac{1}{2b}(x - b^2)$

(2) Find the the derivatives of the following functions.

1pt (a) $f(x) = 3(2x^3 - 9x)^5$ $f'(x) =$ $15(2x^3 - 9x)^4(6x^2 - 9)$

1pt (b) $w = 4\sqrt{e^z + z^2}$ $= 4(e^z + z^2)^{\frac{1}{2}}$ $\frac{dw}{dz} =$ $2(e^z + z^2)^{-\frac{1}{2}}(e^z + 2z)$

$w' = \frac{1}{2} 4(e^z + z^2)^{-\frac{1}{2}}(e^z + 2z)$

1pt (c) $A(t) = \frac{4}{(t^2 + 2t)^4}$ $= 4(t^2 + 2t)^{-4}$ $A'(t) =$ $-16(t^2 + 2t)^{-5}(2t + 2)$

$A' = (-4)(4)(t^2 + 2t)^{-5}(2t + 2)$