Mathematics 122

Quiz #13 Name: Key

You must show your work to get full credit.

1. Find the equation of the tangent line to $y = e^{-x}$ at the point where $x = 0$.

The equation of the tangent line is

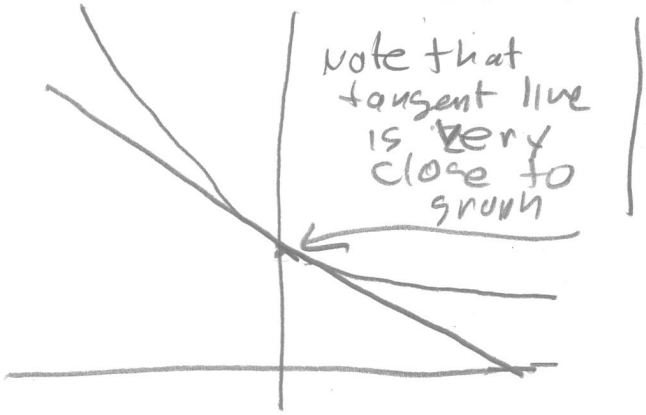
$y = f(x_0) + f'(x_0)(x - x_0)$

In our case $f(x) = e^{-x}$, $x_0 = 0$

$f(x_0) = e^0 = 1$, $f'(x) = -e^{-x}$ $f'(x_0) = f'(0) = -e^0 = -1$

The equation is $y = 1 + (-1)(x - 0) = 1 - x$

Now draw on the same axis the graph of $y = e^{-x}$ and its tangent line at $x = 0$ with $-1 \le x \le 1$.



Y1 = e^(-X)
Y2 = 1 - X
Xmin = -1
Xmax = 1
0: Zoom Fit

2. Find the following derivatives.

(a) $f(x) = 3(2x + 1)^{10}$

$f'(x) = 10 \cdot 3(2x+1)^9(2)$

$f'(x) = 60(2x+1)^9$

(b) $C = 2(e^q + 3q)^4$

$\frac{dC}{dq} = 4 \cdot 2(e^q + 3q)^3 (e^q + 3)$

$\frac{dC}{dq} = 8(e^q + 3q)(e^q + 3)$

(c) $y = 5e^{x^2+3x}$

$y' = 5e^{x^2+3x}(2x + 3)$

$\frac{dy}{dx} = 5(2x+3)e^{x^2+3x}$

Have a good spring break.