Mathematics 122

Quiz 17 Name: Key

You must show your work to get full credit.

1. Find the derivatives of the following functions:

(a) $f(t) = te^{-2t}$. $f'(t) =$ $e^{-2t} - 2te^{2t}$

$f'(t) = (t)'e^{2t} + t(e^{2t})'$
$= 1\, e^{-2t} + t(-2e^{-2t})$

(b) $y = x\ln(x)$. $\frac{dy}{dx} =$ $\ln(x) + 1$

$\frac{dy}{dx} = x'\ln(x) + x(\ln x)'$
$= 1\ln(x) + x(\frac{1}{x})$

(c) $y = te^{-t^2}$ $\frac{dy}{dt} =$ $e^{-t^2} - 2t^2e^{-t^2}$

$y' = (t)'e^{-t^2} + t(e^{-t^2})'$
$= 1\, e^{-t^2} + t\, e^{-t^2}(-2t)$

(d) $z = \frac{1-t}{1+t}$ $\frac{dz}{dt} =$ $\frac{-2}{(1+t)^2}$

$\frac{dz}{dt} = \frac{(1-t)'(1+t) - (1-t)(1+t)'}{(1+t)^2}$

$= \frac{(-1)(1+t) - (1-t)(1)}{(1+t)^2} = \frac{-1-t-1+t}{(1+t)^2} = \frac{-2}{(1+t)^2}$

2. If $f(25) = 3.6$ and $f'(25) = -0.2$ approximate $f(25.4)$. $f(25.4) \approx$ 3.52

$f(25.4) \approx f(25) + f'(25)(.4)$
$= 3.6 + (-.2)(.4)$
$= 3.52$