Mathematics 122

Quiz #20 Name: Key

You must show your work to get full credit.

Let a, b, c, k be constansts. Compute the following derivatives.

1. $f(x) = \dfrac{x}{e^x} = x e^{-x}$ $\qquad f'(x) = \underline{e^{-x} - xe^{-x} = (1-x)e^{-x}}$

$f'(x) = (1)e^{-x} + x(-e^{-x})$

2. $z = \dfrac{1-t}{1+t}$ $\qquad \dfrac{dz}{dt} = \underline{\dfrac{-2}{(1+t)^2}}$

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

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

← ok to stop here

3. $f(x) = \dfrac{ax+b}{cx+k}$ $\qquad f'(x) = \underline{\dfrac{ak-bc}{(cx+k)^2}}$

$$f'(x) = \frac{(ax+b)'(cx+k) - (ax+b)(cx+k)'}{(cx+k)^2}$$

$$= \frac{a(cx+k) - (ax+b)(c)}{(cx+k)^2}$$ ← ok to stop here

$$= \frac{acx + ak - acx - bc}{(cx+k)^2}$$