Mathematics 122

You must show your work to get full credit.

1. Let a, b, c be constants. Compute the following derivatives.

constant → $(ce^b)' = 0$

$y = ce^b + a\ln(x) + c \cdot 7^x$ $y' = \underline{\dfrac{a}{x} + c\ln(7)\,7^x}$

$f(t) = 6t^4 - \frac{c}{at^4} + 6\sqrt{t}.$

$\quad = 6t^4 - \frac{c}{a}t^{-4} + 6t^{\frac{1}{2}}$

$f'(t) = \underline{24t^3 + \frac{4c}{a}t^{-5} + 3t^{-\frac{1}{2}}}$

2. Compute the first and second derivatives of $h(u) = 6u^3 - 3u^2$.

$h'(u) = \underline{18u^2 - 6u}$

$h''(u) = \underline{36u - 6}$

3. Find the equation of the tangent line to $y = e^x$ at the point where $x = 0$.

Equation through (x_0, y_0) The equation is $\underline{y = 1 + x}$
with slope m is

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

In our case $x_0 = 0$, $y_0 = e^0 = 1$

$m = y'(0)$. But $y' = (e^x)' = e^x$ so

$y'(0) = e^0 = 1$

$\quad\quad y - 1 = 1(x - 0)$

$\quad\quad\quad y = 1 + x$