

Name: ANSWERS

Instructions: Answer all problems in the space provided! Do your rough work on scrap paper.

when ur havin fun on spring break ...and jhevon email u like "hey quiz wen u get back!!!!!!1!!!"



1. Let  $f(x)$  and  $g(x)$  be differentiable functions of  $x$ ,  $c$  a constant. Complete the following formulas. (You may use  $f'$  and  $g'$  as shorthand):

(a)  $\frac{d}{dx}(x^n) = \underline{nx^{n-1}}$

(b)  $\frac{d}{dx}e^u = \underline{u'e^u}$

(c)  $\frac{d}{dx}\ln u = \underline{\frac{u'}{u}}$

(d)  $\frac{d}{dx}(f(x) \cdot g(x)) = \underline{f' \cdot g + f \cdot g'}$

(e)  $\frac{d}{dx}\left(\frac{f(x)}{g(x)}\right) = \underline{\frac{f'g - fg'}{g^2}}$

(f)  $\frac{d}{dx}f(g(x)) = \underline{f'(g(x)) \cdot g'(x)}$

(g)  $\frac{d}{dx}(a^u) = \underline{u'a^u \ln a}$

2. Differentiate, or find  $y'$  in, the following (you don't have to simplify):

(a)  $x^2 + y^2 = 4 \Rightarrow y' = \underline{-\frac{x}{y}}$

(d)  $xy + e^y + \ln x = x^2 \Rightarrow y' = \underline{\frac{2x^2 - xy - 1}{x^2 + xe^y}}$

3. Use log differentiation to compute  $\frac{d}{dx}x^x = \underline{y(\ln x + 1) \text{ OR } x^x(\ln x + 1)}$ .

Bonus:

1. Use log differentiation to compute  $\frac{d}{dx}\frac{\sqrt{x}(x+1)^3}{e^x(x^2+1)} = \underline{y\left(\frac{1}{2x} + \frac{3}{x+1} - 1 - \frac{2x}{x^2+1}\right)}$   
*may replace with*

2. Let  $f(x)$  be a differentiable function. Write down the linear approximation formula for  $f(x)$  at  $x = a$ .

$\underline{f(x) \approx f(a) + f'(a)(x-a)}$