

Quiz 5A, Business Calculus

Fall 2014 - Dr. Graham-Squire

7:33

7:39
6

Name: Key

1. (3 points) Solve for x . Either leave your answer in exact form or round to the nearest 2 decimal places.

$$14 = 10 + \ln x + \ln x$$

$$14 - 10 = \ln x + \ln x$$

$$\frac{4}{2} = \frac{2 \ln x}{2} \quad \checkmark \quad 0.5$$

$$2 = \ln x \quad \checkmark \quad 0.5$$

$$\boxed{e^2 = x} \quad \text{or} \quad 7.39$$

2. (3 points) Calculate the derivative of

$$f(x) = \frac{e^{(x^3+2x)}}{\ln x}$$

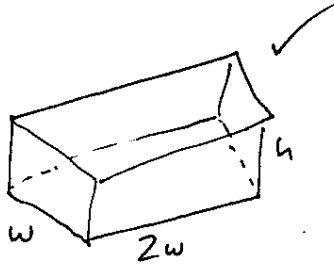
$$f'(x) = \frac{(\ln x)(e^{x^3+2x})(3x^2+2) - (e^{x^3+2x}) \cdot \frac{1}{x}}{(\ln x)^2}$$

Don't need
to simplify

for quotient
rule!

3. (4 points) A rectangular box with an open top is to be constructed in such a way as to maximize the volume. The box must have a total surface area of 100 ft^2 , and must be built such that the length is two times the width. Use calculus to find the dimensions for the width, length, and height that will give the maximum volume.

and round
to nearest
0.1



$$w \cdot 2w \cdot h = V \quad \checkmark$$

$$\Rightarrow V = 2w^2 h \quad \checkmark$$

$$V = 2w^2 \left(\frac{100 - 2w^2}{6w} \right) \quad \checkmark$$

$$V = \frac{100w - 2w^3}{3}$$

$$V'(w) = \frac{1}{3} (100 - 6w^2) \quad \checkmark$$

Surface Area = $2(2wh) + 2(wh) + 2w \cdot w$

$$100 = 6wh + 2w^2 \quad \checkmark$$

$$\frac{100 - 2w^2}{6w} = \frac{6wh}{6w}$$

$$\frac{100 - 2w^2}{6w} = h \quad \checkmark$$

$$0 = \frac{1}{3} (100 - 6w^2) \quad \checkmark$$

$$\Rightarrow 0 = 100 - 6w^2$$

$$\frac{6w^2}{6} = \frac{100}{6}$$

$$\sqrt{w^2} = \sqrt{\frac{100}{6}}$$

$$w = 4.08 \quad \checkmark$$

or $w = 4.1$

\Rightarrow

$$l = 8.2$$

$$h = \frac{100 - 2(4.08^2)}{6(4.08)} = \underline{2.72}$$