MATH 108 – QUIZ 11 – 13 APRIL 2011

Answer all of the following questions in the space provided. Show all work as partial credit may be given. Answers without justification, even if they are correct, will earn no credit.

1. (2 pts. each) Solve the given equations for x. There is no need to express your answer as a decimal approximation.

(a) $3 = 2 + 5e^{-4x}$

$1 = 5e^{-4x}$

$\frac{1}{5} = e^{-4x}$

$\ln(\frac{1}{5}) = \ln(e^{-4x}) = -4x\ln(e) = -4x$

$x = \frac{\ln(1/5)}{-4} = \frac{-\ln(5)}{-4} = \frac{\ln(5)}{4}$ //

(b) $\ln(x) = 2(\ln(3) - \ln(5))$

$\ln(x) = 2\ln(3) - 2\ln(5) = \ln(9) - \ln(25) = \ln(\frac{9}{25})$

$\therefore x = \frac{9}{25}$ //

(c) $\log_2(5x) = 3$

$2^3 = 5x$

$8 = 5x \longrightarrow x = \frac{8}{5}$ //

2. (2 pts. each) Find the derivative of each of the following functions.

(a) $f(x) = 3 + e^{-5x}$

$f'(x) = -5e^{-5x}$ //

(b) $g(t) = t^2\ln(t)$

$g'(t) = t^2 \cdot \frac{1}{t} + \ln(t) \cdot 2t = t + 2t\ln(t)$ //

(c) $f(x) = (1 + e^x)^{1/2}$

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

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1. (2 pts. each) Solve the given equations for x. There is no need to express your answer as a decimal approximation.

(a) $3^x = e^2$

$\ln(3^x) = \ln(e^2)$

$x \ln(3) = 2 \ln(e) = 2$

$\therefore x = \frac{2}{\ln(3)}$ //

(b) $\ln(x) = \ln(16) + 2\ln(2)$

$\ln(x) = \ln(16) + \ln(2^2)$

$= \ln(16) + \ln(4) = \ln(16 \cdot 4) = \ln(64)$ $\therefore x = 64$ //

(c) $\log_3(5x) = -2$

$3^{-2} = 5x \rightarrow \frac{1}{9} = 5x \rightarrow x = \frac{1}{45}$ //

2. (2 pts. each) Find the derivative of each of the following functions.

(a) $f(x) = e^{x^2+2x}$

$f'(x) = e^{x^2+2x} \frac{d}{dx}(x^2+2x) = (2x+2)e^{x^2+2x}$ //

(b) $g(t) = t^2 e^{-t^2}$

$g'(t) = t^2(e^{-t^2} \cdot -2t) + e^{-t^2} \cdot 2t$

$= e^{-t^2}(2t - 2t^3) = e^{-t^2} \cdot 2t(1-t^2)$ //

(c) $f(x) = \frac{\ln(x)}{x}$

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

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