February 25, 2011

Last Name: SOLUTIONS

First Name: _____

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Quiz 4 (A)

Question 1. Evaluate the following integrals:

(a) *(5 marks)*

$$\int_e^{e^9} \frac{dx}{x\sqrt{\ln x}}$$

LET $u = \ln x$

$du = \frac{1}{x}dx$

$dx = x\,du$

IF $x = e \Rightarrow u = 1$

$x = e^9 \Rightarrow u = \ln e^9 = 9$

$$= \int_1^9 \frac{x\,du}{x\sqrt{u}} = \int_1^9 u^{-1/2}\,du = 2u^{1/2}\Big|_1^9$$

$$= 2\cdot 9^{1/2} - 2\cdot 1^{1/2}$$

$$= 2(3) - 2 = 4$$

(b) *(5 marks)*

$$\int t^5 \ln t\,dt$$

LET $u = \ln t$ $\quad dv = t^5\,dt$

$du = \frac{1}{t}dt$ $\quad v = \frac{1}{6}t^6$

$$= uv - \int v\,du$$

$$= \frac{1}{6}t^6\ln t - \int \frac{1}{6}t^6\cdot\frac{1}{t}\,dt = \frac{t^6\ln t}{6} - \frac{1}{6}\int t^5\,dt$$

$$= \frac{t^6\ln t}{6} - \frac{1}{6}\cdot\frac{t^6}{6} + C$$

$$= \frac{t^6\ln t}{6} - \frac{1}{36}t^6 + C$$