MATH 1272 Spring 2014
January 30, 2014

Recitation Quiz
20 minutes

Name: SOLUTIONS
Lecture 030 Section #: _____

Evaluate the following integrals.

1. $\int x^2 \ln(x)\, dx$ (35%)

$u = \ln(x)$ $\quad dv = x^2\, dx$

$du = \frac{1}{x}\, dx$ $\quad v = \frac{x^3}{3}$

$$\int x^2 \ln(x)\, dx = \frac{x^3 \ln(x)}{3} - \frac{1}{3}\int x^3 \cdot \frac{1}{x}\, dx$$

$$= \frac{x^3 \ln(x)}{3} - \frac{1}{3}\int x^2\, dx$$

$$= \frac{x^3 \ln(x)}{3} - \frac{1}{3}\left(\frac{x^3}{3}\right) + C$$

2. $\int \sin(t) e^{\cos(t)} dt$ (15%)

$u = \cos(t)$

$du = -\sin(t)\, dt$

$$\int \sin(t) e^{\cos(t)}\, dt = \int -e^u\, du$$

$$= -e^u + C$$

$$= -e^{\cos(t)} + C$$

Please turn the page.

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3. $\int e^{2x}\cos(x)\,dx$ (35%)

$u = e^{2x}$ $\quad dv = \cos(x)\,dx$

$du = 2e^{2x}$ $\quad v = \sin(x)$

$$\int e^{2x}\cos(x)\,dx = e^{2x}\sin(x) - 2\int e^{2x}\sin(x)\,dx$$

$u = e^{2x}$ $\quad dv = \sin(x)\,dx$

$du = 2e^{2x}\,dx$ $\quad v = -\cos(x)$

$$\int e^{2x}\cos(x)\,dx = e^{2x}\sin(x) - 2\left[-e^{2x}\cos(x) + 2\int e^{2x}\cos(x)\,dx\right]$$

$$\int e^{2x}\cos(x)\,dx = e^{2x}\sin(x) + 2e^{2x}\cos(x) - 4\int e^{2x}\cos(x)\,dx$$

$$5\int e^{2x}\cos(x)\,dx = e^{2x}\left(\sin(x) + 2\cos(x)\right) + C$$

4. Which of the following substitutions can be used to evaluate the following integral? Choose only one answer. (15%)

$$\int \sec^4(\theta)\tan^7(\theta)\,d\theta$$

a. $u = \sec(\theta)$

b. $u = \tan(\theta)$

c. either $u = \sec(\theta)$ or $u = \tan(\theta)$

d. $u = \sin(\theta)$

e. $u = \tan(\theta) + \sec(\theta)$

f. $u = \sec(\theta)\tan(\theta)$

Please turn the page.