

November 1, 2007

 Name

Technology used:

Directions: Be sure to include in-line citations every time you use technology. Include a careful sketch of any graph obtained by technology in solving a problem. **Only write on one side of each page.**

Evaluate each integral in this exam BY HAND unless told otherwise.

Do any three (3) of the following.

- Find the volume of the solid generated by revolving the region bounded by the x -axis and the curve $y = x \sin(x)$, $0 \leq x \leq \pi$ about the y -axis
- Evaluate the integral $\int e^x \sec^4(e^x) dx$
- Evaluate the integral

$$\int \frac{dx}{x^2 \sqrt{x^2 - 1}}$$

- (10 points) Express the integrand of the following integral as a sum of partial fractions with undetermined coefficients. **Read the directions carefully. Do not solve.**

$$\int \frac{6x^{12} - x^5 + 4x^4 + 7}{x^3(x-2)^2(x^2+4)(x^2+x+9)^3} dx$$

- Integrate directly or use the accompanying table of integrals to evaluate the following integral. Either show your work or cite the number of the formula in the table that you use.

$$\int \tan^5(2x) dx$$

Do any three (3) of the following problems

- A. Use integration by parts to establish the reduction formula

$$\int x^n e^{ax} dx = \frac{x^n e^{ax}}{a} - \frac{n}{a} \int x^{n-1} e^{ax} dx, \quad a \neq 0$$

- B. Evaluate the integral below. One approach is to first make a simplifying substitution and then make a trigonometric substitution to finish.

$$\int \frac{dy}{y \sqrt{4 + [\ln(y)]^2}}$$

- C. Evaluate the integral

$$\int \frac{\sin(\theta) d\theta}{\cos^2(\theta) + \cos(\theta) - 2}$$

- D. Integrate directly or use the accompanying table of integrals to evaluate the following integral. Either show your work or cite the number of the formula in the table that you use. You might need to make a substitution first.

$$\int \frac{\arcsin(x)}{x^2} dx$$