

### Multiple Choice

1.(5 pts.) Evaluate

$$\int \tan^3(x) \sec^3(x) dx .$$

(a)  $-\frac{1}{5} \sec^5(x) + \frac{1}{3} \sec^3(x) + C$

(b)  $\frac{1}{3} \sec^3(x) - \sec(x) + C$

(c)  $\frac{1}{5} \sec^5(x) + \frac{1}{3} \sec^3(x) + C$

(d)  $\frac{1}{5} \sec^5(x) - \frac{1}{3} \sec^3(x) + C$

(e)  $\frac{1}{3} \sec^3(x) + \sec(x) + C$

2.(5 pts.) Which equation below is the partial fraction of the rational function

$$\frac{5x^2 - 10x - 8}{(x - 2)(x^2 + 4)}$$

(a)  $\frac{-1}{x - 2} + \frac{2}{x^2 + 4}$

(b)  $\frac{-1}{x - 2} + \frac{6x + 2}{x^2 + 4}$

(c)  $\frac{5}{x - 2} + \frac{x + 1}{x^2 + 4}$

(d)  $\frac{-1}{x - 2} + \frac{x + 2}{x^2 + 4}$

(e)  $\frac{5}{x - 2} + \frac{6x + 1}{x^2 + 4}$

3.(5 pts.) Evaluate

$$\int \frac{-5}{x^2 - x - 6} dx.$$

(a)  $-\frac{10}{\sqrt{23}} \arctan\left(\frac{2x + 1}{\sqrt{23}}\right) + C$

(b)  $\ln\left(\left|\frac{x - 2}{x + 3}\right|\right) + C$

(c)  $-5 \arcsin\left(\frac{2x + 1}{\sqrt{23}}\right) + C$

(d)  $\ln(|x^2 - x - 6|) + C$

(e)  $\ln\left(\left|\frac{x + 2}{x - 3}\right|\right) + C$

4.(5 pts.) Suppose the Midpoint rule is to be used to approximate the integral

$$\int_0^{10} \sin(\sqrt{6} x) dx .$$

What is the minimum number of points required to guarantee an accuracy of 1/1000?

- (a) 450            (b) 500            (c) 600            (d) 550            (e) 650

5.(5 pts.) Compute

$$\int_1^{\infty} \frac{1}{x^3} dx.$$

- (a)  $-1/2$             (b) 2            (c)  $1/2$             (d) Diverges            (e) 0

6.(5 pts.) Compute

$$\int_0^2 \frac{1}{x-1} dx.$$

- (a) Diverges            (b) 2            (c) 0            (d) 4            (e)  $-2$

7.(5 pts.) Find the length of the curve

$$y = \frac{1}{2} \cosh(2x) = \frac{e^{2x} + e^{-2x}}{4} \quad 0 \leq x \leq 2.$$

- (a)  $\frac{e^4 + e^{-4} - 1}{2}$             (b)  $\frac{e^4 + e^{-4} - 1}{4}$             (c)  $\frac{2e^4 - 2e^{-4} - 1}{8}$   
(d)  $\frac{e^4 - e^{-4}}{2}$             (e)  $\frac{e^4 - e^{-4}}{4}$

8.(5 pts.) Find the area of the surface obtained by rotating the curve about the  $x$ -axis:

$$y = \sqrt{x} \quad 0 \leq x \leq 4.$$

- (a)  $\frac{\pi}{6} (17\sqrt{17} - 1)$             (b)  $\frac{\pi}{2} (17\sqrt{17} - 1)$             (c)  $\frac{\pi}{6} (65\sqrt{65} - 1)$   
(d)  $\frac{\pi}{2} (65\sqrt{65} - 1)$             (e)  $\frac{\pi}{6} (2\sqrt{2} - 1)$

9.(5 pts.) Find the centroid of the region bounded by:

$$y = x^4, \quad y = 1.$$

- (a)  $(5/9, 0)$       (b)  $(0, 4/9)$       (c)  $(4/9, 0)$       (d)  $(0, 5/9)$       (e)  $(0, 8/9)$

10.(5 pts.) Find the solution of the ordinary differential equation that satisfies the given initial condition

$$\frac{dy}{dx} = \sec^2(x)e^{-y} \quad y(0) = 1.$$

- (a)  $y = \tan(x) + 1$       (b)  $y = \ln(-\tan(x) + e)$       (c)  $y = \ln(\tan(x) + e)$   
(d)  $y = \tan(x)$       (e)  $y = \ln(\tan(x))$

11.(5 pts.) A sample of radioactive material decays to 1/5 of its original amount in one day. How long would it take to decay to 1/100 of its original amount?

- (a)  $\ln(95)$       (b)  $\ln(20)$       (c)  $-\frac{\ln(100)}{\ln(5)}$       (d)  $\frac{\ln(100)}{\ln(5)}$       (e) 20

### Partial Credit

You must show your work on the partial credit problems to receive credit!

12.(15 pts.) Evaluate:

$$\int \frac{x^2}{\sqrt{1-4x^2}} dx.$$

13.(15 pts.) Consider the integral

$$\int_0^2 (2x + 3) dx.$$

- (a) (5 pts.) Evaluate this integral exactly.  
(b) (8 pts.) Using the Trapezoidal Rule with  $n = 4$  find an approximation to the integral.  
(c) (2 pts.) Explain your answer in part (b). **Hint:** Consider the error.

14.(15 pts.) Find the area of the surface obtained by rotating the curve about the  $y$ -axis:

$$x = \sqrt{a^2 - y^2} \quad 0 \leq y \leq a.$$

Specifically,

- (a) (9 pts.) Write an integral which gives the surface area using the general formula for surface area.
- (b) (6 pts.) Evaluate your integral.

Name: ANSWERS

Instructor: ANSWERS

Math 126 Exam II

March 16, 2004

- The Honor Code is in effect for this examination. All work is to be your own.
- No calculators.
- The exam lasts for one hour.
- Be sure that your name is on every page in case pages become detached.
- Be sure that you have all 5 pages of the test.
- The backs of pages may be used if you need additional room to work on a problem.

Good Luck!

PLEASE MARK YOUR ANSWERS WITH AN X, not a circle!

- |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|
| 1.  | (a) | (b) | (c) | (●) | (e) |
| 2.  | (a) | (●) | (c) | (d) | (e) |
| 3.  | (a) | (b) | (c) | (d) | (●) |
| 4.  | (a) | (●) | (c) | (d) | (e) |
| 5.  | (a) | (b) | (●) | (d) | (e) |
| 6.  | (●) | (b) | (c) | (d) | (e) |
| 7.  | (a) | (b) | (c) | (d) | (●) |
| 8.  | (●) | (b) | (c) | (d) | (e) |
| 9.  | (a) | (b) | (c) | (●) | (e) |
| 10. | (a) | (b) | (●) | (d) | (e) |
| 11. | (a) | (b) | (c) | (●) | (e) |

DO NOT WRITE IN THIS BOX!

Total multiple choice: \_\_\_\_\_

12. \_\_\_\_\_

13. \_\_\_\_\_

14. \_\_\_\_\_

**Total:** \_\_\_\_\_