

Name _____ ID _____

MATH 172
Section 502

EXAM 1

Fall 1999
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1-9	/45
10	/15
11	/15
12	/15
13	/10
14	/10

Multiple Choice: (5 points each)

1. Compute: $\int \sqrt{x} \left(x^2 - \frac{1}{x} \right) dx$

- a. $\frac{2x^{7/2}}{7} + \frac{2x^{-3/2}}{3} + C$
- b. $\frac{2x^{7/2}}{7} - 2x^{1/2} + C$
- c. $\frac{2x^{37/2}}{3} + \frac{2x^{-3/2}}{3} + C$
- d. $\sqrt{x} \left(\frac{x^3}{3} - \ln x \right) + \frac{2x^{3/2}}{3} (x^2 - \ln x) + C$
- e. $\frac{2x^{3/2}}{3} \left(\frac{x^3}{3} - \ln x \right) + C$

2. Evaluate $\int_0^2 \sqrt{4-x^2} + 1 dx$ by interpreting it as an area.

- a. $2 + 2\pi$
- b. $1 + \pi$
- c. $1 + 2\pi$
- d. $\pi - 1$
- e. $2 + \pi$

3. Find the area between the parabola $y = x^2$ and the line $y = 2x + 3$.

- a. $-\frac{16}{3}$
- b. $\frac{16}{3}$
- c. $\frac{32}{3}$
- d. 9
- e. $\frac{88}{3}$

4. Compute $\int_1^4 \frac{\ln x}{2\sqrt{x}} dx$

- a. $2\ln 4 - 1$
- b. $2\ln 4 - 2$
- c. $2\ln 4 - 4$
- d. $2\ln 4 - 6$
- e. $\ln 2 - 4$

5. The mass density of a 3 cm bar is $\rho = 1 + x^2 \frac{\text{gm}}{\text{cm}}$ for $0 \leq x \leq 3$. Find the total mass of the bar.

- a. 4 gm
- b. 10 gm
- c. 12 gm
- d. 18 gm
- e. 30 gm

6. The mass density of a 3 cm bar is $\rho = 1 + x^2 \frac{\text{gm}}{\text{cm}}$ for $0 \leq x \leq 3$. Find the x -coordinate of the center of mass of the bar.

- a. $\frac{3}{2}$
- b. 2
- c. $\frac{7}{3}$
- d. $\frac{33}{16}$
- e. $\frac{99}{4}$

7. Compute $\int_0^{\pi/2} \sin^4 \theta \cos \theta \, d\theta$

- a. $-\frac{1}{3}$
- b. $-\frac{1}{5}$
- c. $\frac{1}{6}$
- d. $\frac{1}{5}$
- e. $\frac{1}{3}$

8. Compute $\int_0^{\pi/4} \tan^3 \theta \sec^2 \theta \, d\theta$

- a. $-\frac{1}{4}$
- b. $\frac{1}{4}$
- c. $-\frac{1}{3}$
- d. $\frac{1}{3}$
- e. $-\frac{1}{2}$

9. Compute: $\int_0^2 x\sqrt{4-x^2} \, dx$

- a. $\frac{2\sqrt{2}}{3}$
- b. $\frac{8}{3}$
- c. 24
- d. $\frac{32}{3}$
- e. 6

10. (15 points) Compute $\int_0^1 (t^2 - t) e^{2t} dt$

11. (15 points) Compute $\int_1^2 \frac{\sqrt{x^2 - 1}}{x} dx$

You must evaluate any inverse trig functions in the answer.

12. (15 points) Find the arc length of the parametric curve $x = \frac{1}{2}t^6$, $y = t^4$ between $t = 0$ and $t = 1$.

HINT: Factor the quantity in the square root.

13. (10 points) Find the volume of the solid whose base is the triangle with vertices $(0, -1)$, $(1, 0)$ and $(0, 1)$ and whose crosssections perpendicular to the x -axis are semicircles.

14. (10 points) The area between the parabola $y = x^2$ and the line $y = x$ is rotated about the indicated axis. Find the volume of the solid swept out.

a. x -axis

b. y -axis