Name_____ ID_____

1-10	/60
11	/10
12	/10
13	/10
14	/10

MATH 172   EXAM 1   Spring 1999

Section 504   P. Yasskin

Multiple Choice: (6 points each)

1. Evaluate $\displaystyle\int_0^3 2 + \sqrt{9 - x^2}\ dx$ by interpretating it as an area.

   a. $6 + \dfrac{9\pi}{4}$

   b. $3 + 9\pi$

   c. $2 + \dfrac{9\pi}{2}$

   d. $2 + 9\pi$

   e. $6 + 9\pi$

2. Compute: $\displaystyle\int_1^2 \left(x^3 + x + \dfrac{1}{x^3} \right) dx$

   a. $\dfrac{47}{8}$

   b. $\dfrac{45}{8}$

   c. $\dfrac{351}{64}$

   d. $\dfrac{415}{64}$

   e. $\dfrac{417}{64}$

3. Compute: $\displaystyle\int_0^{\pi/4} \cos^3\theta \, \sin\theta \ d\theta$

   a. $-\dfrac{3}{16}$

   b. $-\dfrac{1}{16}$

   c. $\dfrac{1}{16}$

   d. $\dfrac{3}{16}$

   e. 3

4. Compute: $\dfrac{d}{dx}\displaystyle\int_{x}^{x^2} e^{t^2}\,dt$

   a. $e^{x^4} - e^{x^2}$

   b. $e^{x^4}2x - e^{x^2}$

   c. $e^{x^4}4x^3 - e^{x^2}$

   d. $e^{4x^2} - e^{x^2}$

   e. $e^{4x^2}2x - e^{x^2}$

5. Compute: $\displaystyle\int \dfrac{x^2+1}{(x^3+3x)^2}\,dx$

   a. $\dfrac{-3}{x^3+3x} + C$

   b. $\dfrac{-1}{x^3+3x} + C$

   c. $\dfrac{-1}{3x^3+9x} + C$

   d. $\dfrac{1}{x^3+3x} + C$

   e. $\dfrac{3}{x^3+3x} + C$

6. Compute: $\displaystyle\int_{1}^{e} x^4 \ln x \, dx$

   a. $\dfrac{4}{25}e^5 + \dfrac{1}{25}$

   b. $\dfrac{4}{25}e^5 - \dfrac{1}{25}$
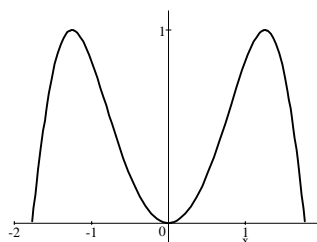
   c. $\dfrac{4}{25}(e^5 - 1)$

   d. $\dfrac{4}{25}(e^5 + 1)$

   e. $\dfrac{1}{5}(e^5 + 1)$

7. Find the area between the curves $y = 12 - x^2$ and $y = y = 2x^2$.

    a. 2

    b. 4

    c. 12

    d. 24

    e. 32

8. The region below $y = \sin(x^2)$ above the x-axis for $0 \le x \le \sqrt{\pi}$ is rotated about the y-axis. Find the volume of the solid swept out.

    a. $\dfrac{\pi}{2}$

    b. π

    c. 2π

    d. 3π

    e. 4π

9. The force needed to stretch a **superspring** x m beyond its natural length is $F = kx^3$. If it takes 32 N to stretch the superspring by 2 m, how much work is done in stretching it from 1 m to 2 m?

    a. 3

    b. 7

    c. 15

    d. 31

    e. 63

10. The mass density of a 9 m rod is $\rho = \dfrac{18}{(1+x)^3} \ \frac{kg}{m}$ for $0 \le x \le 9$. Find the average density of the rod.

    a. $.495 \ \frac{kg}{m}$

    b. $.99 \ \frac{kg}{m}$

    c. $.4995 \ \frac{kg}{m}$

    d. $.999 \ \frac{kg}{m}$

    e. $.49995 \ \frac{kg}{m}$

11. (10 points)   Compute: $\displaystyle\int_0^1 \frac{\arctan x}{1+x^2}\, dx$

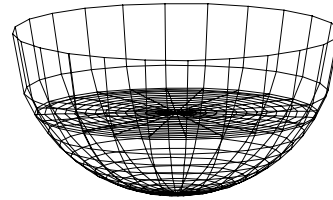**12.** (10 points)   Compute: $\displaystyle\int \sec^3\theta\ \tan^3\theta\ d\theta$

13. (10 points)

A hemispherical bowl of radius 2 ft
is filled to a depth of 1 ft.
Find the volume of the water.
HINT: Slice it horizontally.

14. (10 points)   How much work is done in pumping the water out the top of the bowl shown in problem **13**? Leave the density as ρ and the acceleration of gravity as g.