

217 FINAL EXAM - MAY 14, 2003

NAME: \_\_\_\_\_

T.A.: \_\_\_\_\_

**INSTRUCTIONS:** Show all your work. Answers alone will receive little or no credit. Be neat. We do not want to be required to guess at what you're doing. We must be able to see how you got to your answer. **Take your time and be careful with your calculations. A mistake early in your work could be costly.** There are two parts to the exam. Part I is review material. Part II is newly covered material. Each part is worth 100 points.

1. \_\_\_\_\_ 7. \_\_\_\_\_

2. \_\_\_\_\_ 8. \_\_\_\_\_

3. \_\_\_\_\_ 9. \_\_\_\_\_

4. \_\_\_\_\_ 10. \_\_\_\_\_

5. \_\_\_\_\_ 11. \_\_\_\_\_

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

TOTAL \_\_\_\_\_

**PART I**

1. (10 p'ts.) Evaluate  $\int (\pi x^3 + 1)^4 (x^2) dx$

Ans. \_\_\_\_\_

2. (20 p'ts.) Evaluate the limit  $\lim_{n \rightarrow \infty} \sum_{i=1}^n \frac{(2i-3)^2}{n^3}$ .

Ans. \_\_\_\_\_

3. (20 p'ts.) The base of a solid is the first quadrant plane region bounded by  $y = 3 - \frac{x^2}{3}$ , the  $x$ -axis and the  $y$ -axis. The cross sections perpendicular to the  $x$ -axis are squares. Find the volume of the solid.

Ans. \_\_\_\_\_

4. (20 p'ts.) A solid is generated by rotating the plane region in the first quadrant bounded by  $y = x^2$  and  $y = 3 - 2x$  about the  $x$ -axis. Find the volume of the solid.

Ans. \_\_\_\_\_

5. (20 p'ts.) Find the area of the surface generated by revolving the curve given by  $x = 3 \cos t$ ,  $y = 3 \sin t$ ;  $0 \leq t \leq \pi/4$  about the  $y$ -axis.

Ans. \_\_\_\_\_

6. (10 p'ts.) Evaluate  $\int \frac{(\ln x)^2}{x} dx$

Ans. \_\_\_\_\_

**PART II**

7. (20 p'ts.) Evaluate

a)  $\int \frac{3x \, dx}{\sqrt{1-x^4}}$ ,

Ans. \_\_\_\_\_

b)  $\int_{-\pi/2}^0 \sin^3(x) dx.$

Ans. \_\_\_\_\_

8. (15 p'ts.) Evaluate  $\int_1^2 \frac{1}{(x^2+4)^{3/2}} dx$ .

Ans. \_\_\_\_\_

9. (15 p'ts.) Evaluate  $\int_1^{e^\pi} \sin(\ln(x)) dx$ .

Ans. \_\_\_\_\_

10. (20 p'ts.) Evaluate  $\int \frac{x^2-6x-7}{x^2-x-12} dx$ .

Ans. \_\_\_\_\_

11. (15 p'ts.) Find the limit  $\lim_{x \rightarrow 1} \left[ \frac{1}{x-1} - \frac{x}{\ln x} + 1 \right]$ .

Ans \_\_\_\_\_

12. (15 p'ts.)  $\int_{-1}^1 \frac{1}{x^{4/3}} dx$ . Evaluate the integral or show that it diverges.

Ans. \_\_\_\_\_