

Form C

Math 1206 Common Part of Final Exam December 9, 2005

INSTRUCTIONS: Please enter your NAME, ID NUMBER, FORM designation, and CRN on your op scan sheet. The CRN should be written in the upper right-hand box labeled "Course." Do not include the course number. In the box labeled "Form," write the appropriate test form letter shown above. Darken the appropriate circles below your ID number and Form designation. **Use a 2 pencil.**

Mark your answers to the test questions in rows 1-15 of the op-scan sheet. You have 1 hour to complete this part of the final exam. Your score on this part of the final exam will be the number of correct answers. Turn in the op scan sheet with your answers and the question sheets, including this cover page, at the end of this part of the final exam. Any additional parts of the exam will begin after all students have completed this common part.

Exam Policies: You may **not** use a book, notes, a formula sheet, a calculator, or a computer. Giving or receiving unauthorized aid is an Honor Code Violation.

Signature _____

Name (printed) _____

Student ID _____

1. It requires 10 in-pounds of work to stretch a spring from its natural length of 10 inches to a length of 12 inches. How much additional work (in inch-pounds) is done in stretching it one inch further?

(1) $\frac{125}{72}$

(2) $\frac{845}{72}$

(3) $\frac{25}{2}$

(4) $\frac{45}{2}$

2. The region in Quadrant I bounded by the graph of $y = x$, the y-axis, and the circle $x^2 + y^2 = 4$ is revolved about the line $x = 4$. Which integral expresses the volume of the solid?

(1) $\pi \int_0^2 (4-y)^2 dy$

(2) $2\pi \int_0^{\sqrt{2}} \sqrt{4-x^2} (4-x) dx$

(3) $\pi \int_0^2 (4-y^2) dy$

(4) $2\pi \int_0^{\sqrt{2}} (\sqrt{4-x^2} - x)(4-x) dx$

3. $\int x^2 e^x dx =$

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

(2) $x^2 e^x - 2x e^x + 2e^x + C$

(3) $x^2 e^x - 2x e^x + C$

(4) $x^2 e^x - 2x e^x - 2e^x + C$

4. $\int \sin^2 x \cos^3 x dx =$

(1) $\frac{\sin^3 x}{3} \cdot \frac{\cos^4 x}{4} + C$

(2) $\frac{\sin^5 x}{5} + C$

(3) $2 \cos^4 x \sin x - 3 \cos^2 x \sin^2 x$

(4) $\frac{\sin^3 x}{3} - \frac{\sin^5 x}{5} + C$

5. Evaluate $\lim_{x \rightarrow 0^+} (1 + \sin 3x)^{2/x}$

(1) 2

(2) e^2

(3) 6

(4) e^6

6. Which integral equals the area of the region bounded by the graphs of $y = x^2 - 1$ and $y = x + 1$?

(1) $\int_2^3 [(x+1) - (x^2-1)] dx$

(2) $\int_2^3 [(x^2-1) - (x+1)] dx$

(3) $\int_{-1}^2 [(x+1) - (x^2-1)] dx$

(4) $\int_{-1}^2 [(x^2-1) - (x+1)] dx$

7. The region bounded by the x-axis and the graph of $y = \sin x$, $0 \leq x \leq \pi$ is revolved about the line $y = -1$. Which integral expresses the volume of the solid?

(1) $\pi \int_0^\pi (\sin x + 1)^2 dx$

(2) $\pi \int_0^\pi (\sin^2 x + 2 \sin x) dx$

(3) $2\pi \int_0^\pi x \sin x dx$

(4) $2\pi \int_0^\pi x (\sin x + 1) dx$

8. A lamina with constant density $\rho = 1$ covers the region in Quadrant I bounded by the graphs of $y = x$ and $y = x^3$. The x-coordinate of the centroid is

(1) $\frac{\int_0^1 x(x - x^3) dx}{\text{Mass}}$

(2) $\frac{\frac{1}{2} \int_0^1 (x^2 - x^6) dx}{\text{Mass}}$

(3) $\frac{\int_0^1 y(y^{1/3} - y) dy}{\text{Mass}}$

(4) None of the above

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

(1) $2 \ln \left| \frac{x-1}{x+1} \right| + C$

(2) $4 \tan^{-1} x + C$

(3) $2 \ln |x^2 - 1| + C$

(4) $4 \ln |x^2 - 1| + C$

10. $\int \frac{dx}{\sqrt{5 - x^2 - 4x}} =$

(1) $\sin^{-1} \left(\frac{x+2}{3} \right) + C$

(2) $\sin^{-1}(x+2) + C$

(3) $\frac{1}{3} \tan^{-1} \left(\frac{x+2}{3} \right) + C$

(4) $\frac{\ln \sqrt{5 - x^2 - 4x}}{-2x - 4} + C$

11. $\frac{d}{dx} \int_1^{4x} \sqrt{e^t - 1} dt =$

(1) $\sqrt{e^{4x} - 1}$

(2) $4\sqrt{e^{4x} - 1}$

(3) $\sqrt{e^{4x} - 1} - \sqrt{e^4 - 1}$

(4) $4\sqrt{e^{4x} - 1} - 4\sqrt{e^4 - 1}$

12. Calculate $\int_0^1 x e^{x^2} dx$

(1) $\left[\frac{x^2}{2} \cdot \frac{e^{x^2}}{2} \right]_0^1$

(2) $\left[\frac{(x-1)e^{x^2}}{2} \right]_0^1$

(3) $\frac{e-1}{2}$

(4) None of the above

13. $\lim_{x \rightarrow 0} \frac{e^x - 1 - x - 2x^2}{e^x - 1 - x + 3x^2} =$

(1) 1

(2) $-\frac{2}{3}$

(3) $-\frac{3}{7}$

(4) None of the above

14. A ball is thrown straight up into the air from a point 64 feet above the ground with an initial speed of 48 feet/sec. What is its impact speed (in feet per second) when it strikes the ground? [Ignore air resistance, use $g = 32$ for the numerical value of the gravitational constant.]

(1) 80

(2) 64

(3) 16

(4) 48

15. The integral $\int_0^{\infty} \frac{dx}{e^x}$ has the value

(1) 0

(2) 1

(3) $\frac{1}{e}$

(4) No Value. Integral Diverges.