

**MATH 152, Spring 2010
COMMON EXAM II - VERSION B**

LAST NAME, First name (print): _____

INSTRUCTOR: _____

SECTION NUMBER: _____

UIN: _____

SEAT NUMBER: _____

DIRECTIONS:

1. The use of a calculator, laptop or computer is prohibited.
2. In Part 1 (Problems 1-10), mark the correct choice on your ScanTron using a No. 2 pencil. *For your own records, also record your choices on your exam!*
3. In Part 2 (Problems 11-15), present your solutions in the space provided. *Show all your work* neatly and concisely and *clearly indicate your final answer*. You will be graded not merely on the final answer, but also on the quality and correctness of the work leading up to it.
4. Be sure to *write your name, section number and version letter of the exam on the ScanTron form*.

THE AGGIE CODE OF HONOR

“An Aggie does not lie, cheat or steal, or tolerate those who do.”

Signature: _____

DO NOT WRITE BELOW!

Question	Points Awarded	Points
1-10		40
11		12
12		12
13		10
14		10
15		16
		100

PART I: Multiple Choice

1. (4 pts) The integral $\int_0^{\infty} e^{-2x} dx$

- (a) Converges to $\frac{1}{4}$
- (b) Converges to 2
- (c) Converges to 0
- (d) Converges to $\frac{1}{2}$
- (e) Diverges

2. (4 pts) Find the surface area obtained by rotating the curve $x = \sin(2t)$, $y = \cos(2t)$, $0 \leq t \leq \frac{\pi}{4}$, about the x -axis.

- (a) 4π
- (b) $\frac{\pi}{4}$
- (c) π
- (d) $\frac{\pi}{2}$
- (e) 2π

3. (4 pts) $\int \frac{x^2}{x+3} dx =$

- (a) $\frac{x^2}{2} - 3x + 9 \ln|x+3| + C$
- (b) $x^2 \ln|x+3| + C$
- (c) $\frac{x^2}{2} + 3x - 9 \ln|x+3| + C$
- (d) $\frac{x^3/3}{x^2/2 + 3x} + C$
- (e) $\frac{x^2}{2} - 3x - 9 \ln|x+3| + C$

4. (4 pts) For what values of p does the series $\sum_{n=1}^{\infty} \frac{n^2 + 1}{n^p + n}$ converge?

- (a) all $p > 3$
- (b) all $p \geq 3$
- (c) all $p \geq 1$
- (d) all $p \geq 2$
- (e) all $p > 1$

5. (4 pts) Find s_3 , the 3rd partial sum, of the series $\sum_{n=1}^{\infty} \frac{\cos(n\pi)}{n}$.

- (a) $-\frac{11}{6}$
- (b) $\frac{11}{6}$
- (c) $\frac{1}{6}$
- (d) $-\frac{5}{6}$
- (e) $\frac{5}{6}$

6. (4 pts) Find the length of the curve $y = 4x^{3/2}$, $0 \leq x \leq 1$.

- (a) $\frac{1}{24} (17\sqrt{17} - 1)$
- (b) $\frac{1}{216} (145\sqrt{145} - 1)$
- (c) $\frac{1}{54} (37\sqrt{37} - 1)$
- (d) $\frac{1}{9} (7\sqrt{7} - 1)$
- (e) $\frac{1}{54}$

7. (4 pts) If we apply the Comparison Theorem for Improper Integrals, we find that $\int_0^1 \frac{e^{-x}}{\sqrt{x}} dx$

(a) Diverges by comparison to $\int_0^1 \frac{1}{\sqrt{x}} dx$

(b) Converges by comparison to $\int_0^1 \frac{1}{\sqrt{x}} dx$

(c) Diverges by comparison to $\int_0^1 e^{-x} dx$

(d) Converges by comparison to $\int_0^1 e^{-x} dx$

(e) There is not enough information to determine whether $\int_0^1 \frac{e^{-x}}{\sqrt{x}} dx$ converges or diverges.

8. (4 pts) Which of the following integrals is equivalent to $\int_0^1 \sqrt{4-x^2} dx$?

(a) $2 \int_0^{\pi/3} \cos \theta d\theta$

(b) $4 \int_0^{\pi/6} \cos^2 \theta d\theta$

(c) $2 \int_0^{\pi/6} \cos \theta d\theta$

(d) $4 \int_0^{\pi/3} \cos^2 \theta d\theta$

(e) $4 \int_0^{\pi/2} \cos^2 \theta d\theta$

9. (4 pts) Which of the following integrals gives the surface area obtained by rotating the curve $y = e^x + x$, $0 \leq x \leq 1$, about the y axis?

(a) $\int_0^1 2\pi x \sqrt{e^{2x} + 2e^x + 2} dx$

(b) $\int_0^1 2\pi(e^x + x) \sqrt{e^{x^2} + 2e^x + 2} dx$

(c) $\int_0^1 2\pi(e^x + x) \sqrt{e^{2x} + 2e^x + 2} dx$

(d) $\int_0^1 2\pi x \sqrt{e^{2x} + 2} dx$

(e) $\int_0^1 2\pi x \sqrt{e^{x^2} + 2e^x + 2} dx$

10. (4 pts) The sequence $a_n = \sqrt{\frac{3n+1}{4n+3}}$

(a) Converges to $\sqrt{\frac{1}{3}}$

(b) Converges to $\sqrt{\frac{3}{4}}$

(c) Converges to $\frac{3}{4}$

(d) Converges to 0

(e) Diverges

PART II WORK OUT

Directions: Present your solutions in the space provided. *Show all your work* neatly and concisely and *Box your final answer*. You will be graded not merely on the final answer, but also on the quality and correctness of the work leading up to it.

11. (12 pts) Find $\int \frac{x+8}{x^3+4x} dx$.

12. (12 pts) Find $\int \frac{x^3}{\sqrt{x^2+1}} dx$.

13. Determine whether the following series converge or diverge. Support your answer.

a.) (5 pts) $\sum_{n=1}^{\infty} \frac{\cos^2 n}{n\sqrt[4]{n}}$

b.) (5 pts) $\sum_{n=1}^{\infty} \ln \frac{n}{2n+4}$

14. (10 pts) Find the sum of the series $\sum_{n=1}^{\infty} \frac{2^n + (-4)^n}{6^n}$.

15. Consider the series $\sum_{n=1}^{\infty} ne^{-n^2}$

a.) (8 pts) Prove the series converges.

b.) (8 pts) Find s_4 , the fourth partial sum of the series. Do not simplify. How accurate is this estimate to the sum of the series?