MATH 152, Spring 2010
COMMON EXAM II - VERSION A

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

   (a) $\frac{1}{9}\left(7\sqrt{7}-1\right)$

   (b) $\frac{1}{54}\left(37\sqrt{37}-1\right)$

   (c) $\frac{1}{24}\left(17\sqrt{17}-1\right)$

   (d) $\frac{1}{54}$

   (e) $\frac{1}{216}\left(145\sqrt{145}-1\right)$

2. (4 pts) Which of the following integrals gives the surface area obtained by rotating the curve $y = e^x + x$, $0 \le x \le 1$, about the y axis?

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

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

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

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

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

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

   (a) $\frac{x^2}{2}+3x-9\ln|x+3|+C$

   (b) $\frac{x^2}{2}-3x-9\ln|x+3|+C$

   (c) $\frac{x^3/3}{x^2/2+3x}+C$

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

   (e) $\frac{x^2}{2}-3x+9\ln|x+3|+C$

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

(a) Converges to $\frac{1}{2}$

(b) Converges to 0

(c) Converges to $\frac{1}{4}$

(d) Converges to 2

(e) Diverges

5. (4 pts) The sequence $a_n = \sqrt{\frac{3n+1}{4n+3}}$

(a) Converges to 0

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

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

(d) Converges to $\frac{1}{3}$

(e) Diverges

6. (4 pts) For what values of p does the series $\sum_{n=1}^{\infty} \frac{n^2+1}{n^p+n}$ converge?

(a) all $p > 1$

(b) all $p \geq 1$

(c) all $p \geq 2$

(d) all $p \geq 3$

(e) all $p > 3$

7. (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) 2π

(b) $\frac{\pi}{2}$

(c) π

(d) $\frac{\pi}{4}$

(e) 4π

8. (4 pts) Find s_3, the $3rd$ partial sum, of the series $\sum_{n=1}^{\infty} \frac{\cos(n\pi)}{n}$.

(a) $-\frac{5}{6}$

(b) $\frac{5}{6}$

(c) $\frac{11}{6}$

(d) $-\frac{11}{6}$

(e) $\frac{1}{6}$

9. (4 pts) Which of the following integrals is equivalent to $\int_0^1 \sqrt{4-x^2}\,dx$?

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

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

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

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

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

10. (4 pts) If we apply the Comparison Theorem for Improper Integrals, we find that $\int_0^1 \frac{e^{-x}}{\sqrt{x}}\,dx$

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

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

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

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

(e) There is not enough information to detemine whether $\int_0^1 \frac{e^{-x}}{\sqrt{x}}\,dx$ converges or 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 $\displaystyle\int \frac{x^3}{\sqrt{x^2+1}}\,dx$.

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?