MATH 152, Spring 2014
COMMON EXAM II - VERSION A

LAST NAME: ______________________ FIRST NAME: ______________________

INSTRUCTOR: ______________________

SECTION NUMBER: __________

UIN: ______________________

DIRECTIONS:

1. The use of a calculator, laptop or computer is prohibited.
2. In Part 1 (Problems 1-15), 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 16-20), 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
1-15		60
16		9
17		10
18		7
19		6
20		8
		100

PART I: Multiple Choice: 4 points each

1. Evaluate $\int_0^4 \frac{4x^2}{x+2}\,dx$.

   (a) $64 + 16\ln(3)$
   (b) $16\ln(12)$
   (c) $64 + 16\ln(12)$
   (d) $16\ln(3)$
   (e) Integral diverges

2. If the nth partial sum of the series $\sum_{n=1}^{\infty} a_n$ is given by $s_n = \frac{n}{2n+1}$, what is a_4?

   (a) $a_4 = \frac{1}{2}$
   (b) $a_4 = \frac{1}{63}$
   (c) $a_4 = \frac{55}{63}$
   (d) $a_4 = \frac{1}{99}$
   (e) $a_4 = \frac{89}{99}$

3. Which of the following series diverges by the Test for Divergence?

   (a) $\sum_{n=1}^{\infty} \cos\left(\frac{1}{n}\right)$
   (b) $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^4+2}$
   (c) $\sum_{n=1}^{\infty} \frac{n}{n^3+1}$
   (d) $\sum_{n=1}^{\infty} \sin\left(\frac{1}{n}\right)$
   (e) $\sum_{n=1}^{\infty} \frac{4^n}{9^{n+2}}$

4. After making the appropriate trigonometric substutition, the integral $\int_0^2 x^2\sqrt{4-x^2}\,dx$ becomes:

(a) $\int_0^{\pi/4} 16\tan^2\theta\sec^4\theta\,d\theta$

(b) $\int_0^{\pi/2} 8\sin^2\theta\cos\theta\,d\theta$

(c) $\int_0^{\pi/2} 8\sin^2\theta\cos^2\theta\,d\theta$

(d) $\int_0^{\pi/2} 16\sin^2\theta\cos^2\theta\,d\theta$

(e) $\int_0^{\pi/4} 8\tan^2\theta\sec^2\theta\,d\theta$

5. The sequence $a_n = \ln(n) - \ln(4n+2)$

(a) converges to 0

(b) converges to $\ln(4)$

(c) converges to $\ln\left(\frac{1}{4}\right)$

(d) diverges to ∞

(e) diverges to $-\infty$

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

(a) $\frac{3}{2}(10\sqrt{10}-1)$

(b) $\frac{64}{27}$

(c) $\frac{2}{3}(10\sqrt{10}-1)$

(d) $\frac{8}{27}10\sqrt{10}$

(e) $\frac{8}{27}(10\sqrt{10}-1)$

7. $\int \tan^4 x \sec^4 x \, dx =$

(a) $\frac{1}{7}\tan^7 x + \frac{1}{5}\tan^5 x + C$

(b) $\frac{1}{6}\tan^6 x + \frac{1}{4}\tan^4 x + C$

(c) $-\frac{1}{7}\tan^7 x + \frac{1}{5}\tan^5 x + C$

(d) $\frac{1}{7}\tan^7 x - \frac{1}{5}\tan^5 x + C$

(e) $\frac{1}{5}\tan^5 x + \frac{1}{5}\sec^4 x + C$

8. $\sum_{n=1}^{\infty} \frac{3^n}{4^{n+1}} =$

(a) 1

(b) 0

(c) $\frac{3}{28}$

(d) 4

(e) $\frac{3}{4}$

9. Which of the following integrals gives the surface area obtained by revolving the curve $y = \arctan(x)$, $0 \le x \le 1$, about the x-axis?

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

(b) $\int_0^1 2\pi \arctan(x) \sqrt{1 + \left(\frac{1}{x^2-1}\right)^2} \, dx$

(c) $\int_0^1 2\pi \arctan(x) \sqrt{1 + \left(\frac{1}{x^2+1}\right)^2} \, dx$

(d) $\int_0^1 2\pi x \sqrt{1 + \left(\frac{1}{x^2-1}\right)^2} \, dx$

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

10. The integral $\int_{-1}^{2} \frac{dx}{x^2}$

(a) diverges to $-\infty$

(b) diverges to ∞

(c) diverges to 2

(d) diverges to $\frac{1}{2}$

(e) diverges to $\ln 4$

11. Which of the following sequences is both bounded and decreasing?

(a) $a_n = e^{-n}$

(b) $a_n = \cos n$

(c) $a_n = \ln n$

(d) $a_n = \left(\frac{-1}{2}\right)^n$

(e) $a_n = 1 - \frac{1}{n^2}$

12. Find the length of the curve $x = \frac{t^2}{2}$, $y = \frac{t^3}{3}$, $0 \leq t \leq 1$.

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

(b) $\frac{2}{3}(2\sqrt{2} - 1)$

(c) $\frac{3}{4}(2\sqrt{2} - 1)$

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

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

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

(a) $\frac{1}{3}\cos^3 x + \frac{1}{5}\cos^5 x + C$

(b) $-\frac{1}{3}\cos^3 x - \frac{1}{4}\cos^4 x + C$

(c) $-\frac{1}{3}\cos^3 x - \frac{1}{5}\cos^5 x + C$

(d) $-\frac{1}{3}\cos^3 x + \frac{1}{5}\cos^5 x + C$

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

14. $\int \frac{x+2}{x^2(x-1)}\, dx =$

(a) $-3\ln|x| + \frac{2}{x} + 3\ln|x-1| + C$

(b) $3\ln|x| + \frac{2}{x} + 3\ln|x-1| + C$

(c) $-\frac{2}{x} + 3\ln|x-1| + C$

(d) $-3\ln|x| - \frac{2}{x} + 3\ln|x-1| + C$

(e) $\frac{2}{x} + 3\ln|x-1| + C$

15. Find the surface area obtained by rotating the curve $y = x^2$, $0 \le x \le \sqrt{2}$, about the y-axis.

(a) $\frac{\pi}{6}(5\sqrt{5} - 1)$

(b) $\frac{26\pi}{3}$

(c) $\frac{13\pi}{3}$

(d) $\frac{9\pi}{2}$

(e) $\frac{\pi}{8}(5\sqrt{5} - 1)$

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.

16. (9 pts) Integrate $\displaystyle\int \frac{4}{x^3 + 4x}\, dx$.

17. (a) (6 pts) Find s_n, the nth partial sum, for the series $\sum_{n=1}^{\infty}\left(\cos\left(\frac{1}{n}\right)-\cos\left(\frac{1}{n+1}\right)\right)$.

(b) (4 pts) Using the nth partial sum found in part (a), find the sum of the series $\sum_{n=1}^{\infty}\left(\cos\left(\frac{1}{n}\right)-\cos\left(\frac{1}{n+1}\right)\right)$.

18. (7 pts) Using a comparison theorem, prove that the integral $\int_1^{\infty}\frac{dx}{x+e^{4x}}$ converges.

19. (6 pts) Find $\int \sin^2 x \cos^2 x \, dx$

20. (8 pts) Find $\int \frac{dx}{\sqrt{4x^2 + 9}}$