

PRINT

LAST NAME _____ FIRST NAME _____

INSTRUCTOR: _____ SECTION NUMBER: _____

UIN: _____ SEAT NUMBER: _____

Directions

1. The use of all electronic devices is prohibited.
2. In Part 1 (Problems 1-10), mark the correct choice on your Scantron using a No. 2 pencil. **Record your choices on your exam. Scantrons will not be returned.**
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 and version letter of the exam on the Scantron form.**
5. Good Luck!

THE AGGIE CODE OF HONOR

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

Signature: _____



<http://foxtrot.com>

Question	1-10	11	12	13	14	15-16	TOTAL
Points Awarded							
Points Possible	50	10	10	10	10	10	100

1. The partial fraction decomposition of $\frac{x+2}{(x^2-5x-6)(x-1)^2(x^2+3)}$ is

(a) $\frac{A}{x^2-5x-6} + \frac{B}{x-1} + \frac{C}{(x-1)^2} + \frac{D}{x^2+3}$

(b) $\frac{Ax+B}{x^2-5x-6} + \frac{C}{x-1} + \frac{D}{x^2+3}$

(c) $\frac{A}{x-6} + \frac{B}{x+1} + \frac{C}{x-1} + \frac{Dx+E}{x^2+3}$

(d) $\frac{A}{x-6} + \frac{B}{x+1} + \frac{C}{x-1} + \frac{D}{(x-1)^2} + \frac{Ex+F}{x^2+3}$

(e) $\frac{A}{x-6} + \frac{B}{x+1} + \frac{C}{x-1} + \frac{Dx+E}{(x-1)^2} + \frac{Fx+G}{x^2+3}$

2. Which of the following integrals gives the area of the surface obtained by rotating the curve $y = e^{x/2}$ $0 \leq x \leq 2$ about the x -axis.

(a) $2\pi \int_0^2 e^{x/2} \sqrt{1 + \frac{e^x}{4}} dx$

(b) $2\pi \int_0^2 x \sqrt{1 + \frac{e^x}{4}} dx$

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

(d) $2\pi \int_0^2 x \sqrt{1 + 4e^x} dx$

(e) $2\pi \int_0^2 e^{x/2} \sqrt{1 + 4e^x} dx$

3. Compute the arc length of the curve given by the parametric equations $x = \left(\frac{\sqrt{2}}{3}\right) t^{3/2}$, $y = t + 27$ from $t = 0$ to $t = 6$

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

(b) $\frac{1}{3} (13^{3/2} - 1)$

(c) $\frac{14}{3}$

(d) $\frac{4}{3} (6)^{3/2}$

(e) $\frac{32}{3}$

4. Which of the following integrals is equivalent to $\int_{\sqrt{3}}^3 \frac{\sqrt{x^2+9}}{x} dx$?

(a) $\int_{\pi/3}^{\pi/2} \frac{\sec^3(\theta)}{\tan(\theta)} d\theta$

(b) $\int_{\pi/6}^{\pi/4} \frac{\sec(\theta)}{\tan(\theta)} d\theta$

(c) $3 \int_{\pi/3}^{\pi/4} \frac{\sec(\theta)}{\tan(\theta)} d\theta$

(d) $9 \int_{\pi/3}^{\pi/2} \frac{\sec^3(\theta)}{\tan(\theta)} d\theta$

(e) $3 \int_{\pi/6}^{\pi/4} \frac{\sec^3(\theta)}{\tan(\theta)} d\theta$

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

(a) Diverges

(b) Converges to -2

(c) Converges to 2

(d) Converges to 0

(e) Converges to -1

6. The sequence $a_n = \frac{3n^2 + 2n + 1}{5 - 7n^2}$ for $n = 1, 2, 3, \dots$

(a) Diverges

(b) Converges to $-\frac{3}{7}$

(c) Converges to 1

(d) Converges to 0

(e) Converges to $\frac{3n^2 + 2n + 1}{5 - 7n^2}$

7. Compute the sum of the infinite series $\sum_{n=1}^{\infty} \frac{3^{n+1}}{4^n}$.

(a) 12

(b) 9

(c) 6

(d) 4

(e) This sum diverges.

8. Calculate $\int \frac{dx}{x^3 + 2x^2}$

- (a) $\frac{1}{4} \ln \left| \frac{x+2}{x} \right| - \frac{1}{2x} + C$
- (b) $\frac{1}{4} \ln |x^2 + 2x| + \frac{1}{2x} + C$
- (c) $\frac{1}{4} [(x+2)^{-2} - x^{-2}] - \frac{1}{2x} + C$
- (d) $\frac{1}{2} \ln |x| + \arctan \left(\frac{x}{2} \right) + C$
- (e) $\frac{1}{2} \ln |x| + \arctan(2x) + C$

9. The n th term of a sequence is $\arctan(n)$. Which of the following statements is true?

- I. The sequence diverges since $\lim_{n \rightarrow \infty} \arctan n = \infty$.
 - II. The sequence converges to 0.
 - III. The sequence converges to $\pi/2$
- (a) Only I is true.
 - (b) Only II is true.
 - (c) Only III is true.
 - (d) Only I and II are true.
 - (e) All three statements I, II, and III, are false.

10. Which of the following statements is true of the series $\sum_{n=1}^{\infty} \frac{2n+1}{4n+7}$?

- I. It converges by the Divergence Test.
 - II. It converges to $\frac{1}{2}$.
 - III. It diverges.
- (a) Only I is true.
 - (b) Only II is true.
 - (c) Only III is true.
 - (d) Only I and II are true.
 - (e) All three statements I, II, and III, are false.

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.

Integrals you may find useful

$$\int \sec(\theta) d\theta = \ln |\sec(\theta) + \tan(\theta)| + C$$
$$\int \csc(\theta) d\theta = -\ln |\csc(\theta) + \cot(\theta)| + C$$

11. (10 points) Compute the arc length of $y = \frac{1}{2\pi} \ln(\cos(2\pi x))$ from $0 \leq x \leq \frac{1}{8}$.

12. (10 points) Compute $\int \frac{(x+1)^2}{\sqrt{4-(x+1)^2}} dx$

13. (10 points) Compute $\int \frac{(4x^2 - x + 7)}{(x - 1)(x^2 + 4)} dx$

14. (10 points) Compute the following improper integral or show that it diverges. $\int_4^{\infty} \frac{x+7}{x^2-x-6} dx$.

15. (5 points) Determine whether this sequence converges, and if it does, what it converges to. Clearly explain your reasoning. $\{\ln(2n + 1) - \ln(3n + 4)\}_{n=1}^{\infty}$

16. (5 points) Determine whether this series converges, and if it does, what it converges to. Clearly explain your reasoning. $\sum_{n=1}^{\infty} \frac{1 + 4^n}{3^{n+1}}$