MA 162 Exam 2 Fall 2007

Name: _____

10–digit PUID: _____

Lecturer: _____

Recitation Instructor: _____

Recitation Time: _____

Instructions:

1. This package contains 13 problems worth 7.5 points each.
2. Please supply <u>all</u> information requested. On the scantron sheet, print your name, your division–section number and 10 digit PUID number in addition to filling in the corresponding circles. You get 2.5 points for supplying all information correctly.
3. Work only in the space provided, or on the backside of the pages. Circle your choice for each problem in this booklet, and mark your answer on the scantron sheet.
4. No books, notes, calculator or any electronic devices, please.

A short table of trigonometric formulae you may or may not want to use:

$$2\cos\alpha\cos\beta = \cos(\alpha-\beta)+\cos(\alpha+\beta)$$
$$2\sin\alpha\sin\beta = \cos(\alpha-\beta)-\cos(\alpha+\beta)$$
$$2\sin\alpha\cos\beta = \sin(\alpha-\beta)+\sin(\alpha+\beta)$$

1. C 2. E 3. B 4. A 5. B 6. D

7. C 8. E 9. A 10. C 11. A 12. E

13. B

1. $\int_0^{\pi/2} \sin^3 x dx =$

A. $\pi$

B. 1/3

C. 2/3

D. $\pi/2$

E. 3/4

2. $\int_0^{\pi/4} \sec^4 x dx =$

A. $\pi$

B. 1/3

C. 2/3

D. $\pi/2$

E. 4/3

3. $\displaystyle\int_1^{\sqrt{3}} \frac{dx}{(x^2+1)^{3/2}} =$

A. $\pi$

B. $(\sqrt{3}-\sqrt{2})/2$

C. $\pi/7$

D. $(3\sqrt{2}-\sqrt{3})/2$

E. $1/2$

4. The substitution best suited for computing the integral $\displaystyle\int \frac{dx}{\sqrt{1+4x-x^2}}$ is

A. $x = 2+\sqrt{5}\sin\theta$

B. $x = 3\sin\theta$

C. $x = 3+\sin\theta$

D. $x = 2+\sqrt{5}\sec\theta$

E. $x = 5+\sqrt{2}\tan\theta$

5. $\displaystyle\int_4^5 \frac{dx}{x^2-5x+6} =$

A. $\ln 2$

B. $2\ln 2 - \ln 3$

C. $\ln 5 - \ln 4$

D. $\ln 6 - \ln 7$

E. $2\ln 5$

6. The partial fraction decomposition of $\dfrac{1}{(x^2-1)(x^2+4x+9)}$ is of the following form

A. $\dfrac{A}{x^2-1} + \dfrac{B}{x^2+4x+9}$

B. $\dfrac{A}{x^2-1} + \dfrac{Bx+C}{x^2+4x+9}$

C. $\dfrac{A}{x+1} + \dfrac{B}{x-1} + \dfrac{C}{x^2+4x+9}$

D. $\dfrac{A}{x+1} + \dfrac{B}{x-1} + \dfrac{Cx+D}{x^2+4x+9}$

E. Since $x^2+4x+9$ is irreducible, the function cannot be decomposed into partial fractions.

7. $\int_{1/2}^{\infty} \frac{dx}{(1+2x)^2} =$

A. $-2$

B. 2

C. 1/4

D. 4

E. The integral is divergent.

8. Which is true?

I. $\int_0^2 \frac{dt}{t^p}$ is convergent if $p < 1$;

II. $\int_0^2 \frac{dt}{t^p}$ is divergent if $p \geq 1$;

III. $\int_1^{\infty} 2^{-t} dt$ is convergent.

A. Only I

B. Only II

C. Only I and III

D. Only II and III

E. All three

9. Suppose the derivative of a function $g$ is $g'(x) = \sqrt{\sec^4 x - 1}$. Find the length of the curve $y = g(x)$, $0 \leq x \leq \pi/4$.

   A. 1

   B. 2

   C. 4

   D. $\sqrt{3}$

   E. $\sqrt{2}$

10. The region bounded by the $x$ axis, the curves $y = x^3$ and $x = 2$ has area 4. If its centroid is at $(\overline{x}, \overline{y})$, then $\overline{y} =$

    A. 2

    B. 9/4

    C. 16/7

    D. 8/3

    E. 4

11. $\lim_{n\to\infty} \frac{n}{e^{\sqrt{n}}} =$

A. 0

B. 1

C. $1/e$

D. $1/\sqrt{e}$

E. The limit does not exist.

12. $\sum_{j=0}^{\infty} \frac{1+2^j}{3^j} =$

A. 2/3

B. 5/3

C. 3/5

D. 5

E. 9/2

13. Which is a valid reasoning? The series $\sum_{n=1}^{\infty} \frac{2}{n+3}$ is

I. convergent by the integral test;

II. divergent by the integral test;

III. convergent because the $n^{th}$ term goes to 0.

A. Only I

B. Only II

C. Only III

D. Only I and III

E. Neither is valid.