MA 16200 Exam II, Oct 19, 2017

Name ____

10–digit PUID number ____

Recitation Instructor ____

Recitation Section Number and Time ______________________________

Instructions: **MARK TEST NUMBER 13 ON YOUR SCANTRON**

1. Do not open this booklet until you are instructed to.
2. Fill in all the information requested above and on the scantron sheet. On the scantron sheet fill in the little circles for your name, section number and PUID.
3. This booklet contains 12 problems, each worth 8 points. You will get 4 points for correctly supplying information above and on the scantron.
4. For each problem mark your answer on the scantron sheet and also **circle it in this booklet**.
5. Work only on the pages of this booklet.
6. Books, notes, calculators or any electronic device are not allowed during this test and they should not even be in sight in the exam room. You may not look at anybody else's test, and you may not communicate with anybody else, except, if you have a question, with your instructor.
7. You are not allowed to leave during the first 20 and the last 10 minutes of the exam.
8. When time is called at the end of the exam, put down your writing instruments and remain seated. The TAs will collect the scantrons and the booklets.
9. Some useful formulas:

$$\sin(a+b) = \sin a \cos b + \cos a \sin b \qquad 1 - \cos 2a = 2\sin^2 a$$
$$\cos(a+b) = \cos a \cos b - \sin a \sin b \qquad 1 + \cos 2a = 2\cos^2 a$$

$$\int \sec x \, \tan x \, dx = \sec x + C \qquad \int \sec^2 x \, dx = \tan x + C$$

$$\int \frac{1}{x^2+a^2} dx = \frac{1}{a}\tan^{-1}\left(\frac{x}{a}\right) + C \qquad \int \frac{1}{\sqrt{x^2-a^2}} dx = \sin^{-1}\left(\frac{x}{a}\right) + C$$

Questions

1. $\displaystyle\int_0^{3/2} \frac{1}{4y^2+9}\,dy =$

A. $\pi/6$

B. $3\pi/16$

C. $\pi/24$

D. $\pi/12$

E. $2\pi/9$

2. $\displaystyle\int_2^{\infty} \frac{2+u}{u^2}\,du =$

A. 1

B. 2

C. $1/2$

D. The integral is divergent

E. $\ln 2$

3. Find the x-coordinate, $\bar{x}$, of the centroid for the region bounded by $y = 2x$ and $y = x^2$.

A. 2/3

B. 5/3

C. 2

D. 3/2

E. 1

4. Consider the two series

$$\sum_{n=0}^{\infty} \frac{n^2 - 1}{3n^4 + 1}, \qquad \sum_{n=0}^{\infty} \frac{1}{\sqrt{n^2 + 1}}.$$

A. Both are convergent

B. Both are divergent

C. The first one is convergent while the second one is divergent

D. The first one is divergent while the second one is convergent

E. None of the above

5. Find the length of the curve $y = f(x)$ from $x = 0$ to $x = \pi/3$, given its derivative $f'(x) = \sqrt{\sec^2 x \tan^2 x - 1}$.

A. 2

B. $\sqrt{3}/3$

C. 4

D. $\sqrt{2}$

E. 1

6. The area of the surface obtained by revolving the curve $y = 2\sqrt{x}$ from $(0, 0)$ to $(1, 2)$ about the $x-$axis is:

A. $2\pi/3$

B. 8π

C. $8\pi(\sqrt{2} - 1)/3$

D. $8\pi(2\sqrt{2} - 1)/3$

E. $4\pi(\sqrt{2} - 1)/3$

7. $\int_0^{\pi/2} \cos^4 x \, dx =$

A. $\pi/6$

B. $2\pi/9$

C. $3\pi/16$

D. $\pi/5$

E. $5\pi/8$

8. To compute $\displaystyle\int \frac{x^2+1}{x^2-4x+4}\, dx$, one should reduce the integrand to

A. $\frac{A}{x-2} + \frac{B}{x-2}$

B. $x + \frac{A}{x-2} + \frac{B}{(x-2)^2}$

C. $\frac{A}{x-2} + \frac{B}{(x-2)^2}$

D. $1 + \frac{A}{x-2} + \frac{B}{(x-2)^2}$

E. $\frac{A}{x^2} + \frac{B}{x} + C$

9. $\displaystyle\int_0^{\pi/2} \sin^3 t \cos^4 t \, dt =$

A. $5/12$
B. $1/7$
C. $2/35$
D. $3/28$
E. $5/16$

10. To compute $\displaystyle\int_0^1 \frac{x^2}{\sqrt{x^2-2x+2}}\, dx$, the first step is to reduce the integral to:

A. $\int_0^{\pi/2} \sin^2 t \tan t \, dt$
B. $\int_{-\pi/4}^{\pi/4} (1+\sin t)^2 \tan t \, dt$
C. $\int_{-\pi/4}^{0} (1+\tan t)^2 \sec t \, dt$
D. $\int_0^{\pi/4} \tan^2 t \sec t \, dt$
E. $\int_0^{\pi/2} \sin^2 t (1+\sec t) \, dt$

11. Find all p such that the series $\sum_{k=1}^{\infty} \sqrt{\dfrac{k^4}{k^p + 2}}$ converges.

A. $p > 1$

B. $p > 5$

C. $p \geq 6$

D. $p > 6$

E. $p > 7$

12. $\sum_{k=0}^{\infty} \dfrac{2 + 2^k}{3^k} =$

A. ∞

B. 3

C. 8/3

D. 6

E. 14/33