MA 16600 Exam I, September 2015

Name _____

10–digit PUID number _____

Recitation Instructor _____

Recitation Section Number and Time _____

Instructions: **MARK TEST NUMBER O1 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, equally weighted.
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. A collection of trig identities:

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

MA 166 Midterm, September 2015

1. The distance between the points $(1, 3, 4)$ and $(2, 2, -1)$ is

   A. $\sqrt{5}$

   B. $\sqrt{6}$

   C. $\sqrt{8}$

   D. $3\sqrt{3}$

   E. 2

2. $\displaystyle\int_0^{2\pi} \sin^2 \frac{x}{4}\, dx =$

   A. π

   B. $\pi/2$

   C. $\pi^2/2$

   D. 1

   E. 0

3. Rotate the region bounded by the curves $y = e^x - 1$, $y = 1$, and $x = 0$, about y axis. The solid thus obtained has volume given by

   A. $\pi \int_0^{\ln 2} (e^x - 1)^2 dx$

   B. $\pi \int_0^{\ln 2} (1 + \ln x)^2 dx$

   C. $\pi \int_0^1 \ln^2(1 + y) dy$

   D. $\pi \int_{\ln 2}^1 e^{2(1+y)} dy$

   E. None of the above is correct.

4. It requires 8N of force to extend a spring by 0.2m beyond its natural length. How much work does it take to extend this spring by 0.5m from its natural length, in Nm?

   A. 2

   B. 4

   C. 5

   D. 8

   E. 10

5. If θ is the angle between the vectors $\langle 2, 1, -2\rangle$ and $\langle 3, -4, 0\rangle$, then $\cos\theta =$

   A. 0

   B. 2/15

   C. 3/5

   D. 2/3

   E. 3/2

6. The base of a solid is a circular disc in the xy plane of radius 1. Its cross sections perpendicular to the x–axis are isosceles right triangles, with hypotenuse in the base. Find the volume of this solid.

   A. 1/3

   B. 1/6

   C. 3/2

   D. 1/2

   E. 4/3

7. $\displaystyle\int_0^1 \frac{dt}{\sqrt{4-t^2}} =$

A. 0

B. 1

C. $\pi/6$

D. $\pi/3$

E. π

8. In 3 dimensional space, what figure is represented by the pair of equations $x = 2, \quad z = -3$?

A. A plane parallel to the xz plane.

B. A plane perpendicular to the xz plane.

C. A line parallel to the xz plane.

D. A line parallel to the y axis.

E. None of the above.

9. $\int t \sin^{-1} t dt =$

   A. $\frac{t^2}{2} \sin^{-1} t - \int \frac{t^2 dt}{2\sqrt{1-t^2}}$

   B. $\frac{t^2}{2} \int \sin^{-1} t dt$

   C. $-t \cos^{-1} t + C$

   D. $\frac{t^2 \cos^{-1} t}{2} + C$

   E. $t \int \sin^{-1} t dt - \int \frac{t dt}{\sqrt{1-t^2}}$

10. If one vertex of a parallelepiped is $(1, 0, 0)$ and the three neighboring vertices are $(2, 1, 0)$, $(2, 1, 1)$, and $(2, 3, -1)$, then its volume is

    A. -1

    B. 1

    C. 2

    D. 3

    E. 6

11. $\int_0^{\pi} z \cos 3z dz =$

A. $-2/9$

B. $1/6$

C. 0

D. $3 - 3\pi$

E. $\pi/3$

12. The area of the region in the xy plane bounded by the curves $y = e^x$, $y = e^{2x}$, and $x = \ln 2$ is

A. e^{-2}

B. $1/2$

C. 1

D. $2 \ln 2$

E. 2