MA 16020 **EXAM 1** **Form 01**

NAME_____ INSTRUCTOR_____

INSTRUCTIONS

1. Fill in your name and your instructor's name above.
2. You must use a #2 pencil on the scantron answer sheet.
3. Fill in your name, your four digit section number, "01" for the Test/Quiz Number, and your student identification number. Make sure to blacken in the appropriate spaces. If you do not know your section number, ask your instructor. Sign your name.
4. There are 15 questions. Blacken in your choice of the correct answer in the spaces provided on the scantron answer sheet. **Only the scantron answer sheet will be graded. When you have completed the exam, turn in the scantron answer sheet only. You may take the exam booklet with you.**
5. **The exam is self-explanatory. Do not ask your instructor any questions about the exam problems.**
6. **Only one-line calculators (any brand) are allowed. Cell phones and PDA's may not be used as a calculator and must be put away during the exam. NO BOOKS OR PAPERS ARE ALLOWED. Use the back of the test pages for scrap paper.**

VOLUME & SURFACE AREA

Right Circular Cylinder

$V = \pi r^2 h$

$SA = \begin{cases} 2\pi r^2 + 2\pi rh \\ \pi r^2 + 2\pi rh \end{cases}$

Sphere

$V = \frac{4}{3}\pi r^3$

$SA = 4\pi r^2$

Right Circular Cone

$V = \frac{1}{3}\pi r^2 h$

$SA = \pi r\sqrt{r^2 + h^2} + \pi r^2$

1. Evaluate the indefinite integral.

$$\int e^{\tan 2x} \sec^2 2x \; dx$$

A. $e^{\tan 2x} + C$

B. $\frac{1}{2} e^{\tan 2x} + C$

C. $\frac{1}{2} e^{\tan^2 x} + C$

D. $\frac{1}{2} e^{\sec 2x} + C$

E. $\frac{1}{2} \sec^2 x + e^{\tan 2x} + C$

2. Solve the differential equation $y' = x(1 + y)$.

A. $y = Ce^{x^2/2} + 1$

B. $y = e^{x^2} + C$

C. $y = Ce^{x^2}$

D. $y = Ce^{x^2/2} - 1$

E. $y = e^{x^2/2} + C$

3. Find the area bounded by the curves $y = x + 1$, $y = e^{-x}$ and $x = 2$.

   A. $3 + \frac{1}{e^2}$

   B. $\frac{5}{2} + e^{-2} - e^{-1}$

   C. $-e^{-2} + 3$

   D. $\frac{5}{2} + e^{2} - e$

   E. $1 - e^{-2} - e^{-1}$

4. Find the indefinite integral of $\displaystyle\int \frac{1}{\sqrt{x}(3 - \sqrt{x})}\, dx$

   A. $2(\sqrt{x} + \sqrt{3 - x}) + C$

   B. $(3 - \sqrt{x})^{-2} + C$

   C. $-2 \ln |3 - \sqrt{x}| + C$

   D. $2(3 - x)^{1/2} + C$

   E. $2\sqrt{x}\sqrt{3 - x} + C$

5. Solve the differential equation

$$\frac{dy}{dx} + y\cot(x) - 3\csc(x) = 0$$

A. $y = \csc(x) + C$

B. $y = C + 3x\csc(x)$

C. $y = (3x + C)\sin(x)$

D. $y = (3x + C)\csc(x)$

E. $y = x\csc(x) + C\sin(x)$

6. Let P be the population of a certain city where the rate of growth of the city's population is given by $P' = 4t(P - 80)$, where time t is in months. At time $t = 0$, the population is 100 people. What will the population be in 1 month? (Round your answer to the nearest person.)

A. 112 people

B. 126 people

C. 174 people

D. 204 people

E. 228 people

7. The temperature one day was given by $y = 60 - 10\cos(\frac{\pi t}{12})$ where t represents hours after 6 a.m. What was the average temperature that day between noon and 3 p.m.?

   A. $63.7°$

   B. $51.0°$

   C. $69.0°$

   D. $191.2°$

   E. $56.3°$

8. An invasive species of mussels has been found in a lake. The mussel population grows at a rate of $10e^{.5t}$ million mussels per year, where t is measured in years and $t = 0$ corresponds to when they were found. For various reasons, including a biological pesticide that was introduced into the lake, the mussels die at a rate of $t^2 + 5$ million mussels per year. By how many million mussels will the population change during the 5 years immediately after they were found?

   A. $10e^{5/2} - 30$

   B. $20e^{5/2} - \frac{110}{3}$

   C. $5e^{5/2} - \frac{215}{3}$

   D. $20e^{5/2} - \frac{260}{3}$

   E. $5e^{5/2} - 5e^{1/2} - \frac{184}{3}$

9. Solve

$$\left(x^2-4\right)y' + 2xy = 0, \qquad y(0) = -\frac{1}{4}$$

A. $y = -(x^2-4) - \frac{17}{4}$

B. $y = \left(x^2-4\right)/16$

C. $y = 1/\left(x^2-4\right)$

D. $y = -1/\left(x^2+4\right)$

E. $y = -\ln\left|x^2-4\right| - 1/4$

10. Evaluate the definite integral:

$$\int_0^1 x\sqrt{x+1}dx$$

A. $-\frac{4}{15}$

B. $\frac{4-2\sqrt{2}}{15\sqrt{2}}$

C. $\frac{5-2\sqrt{2}}{2\sqrt{2}}$

D. 1

E. $\frac{4+4\sqrt{2}}{15}$

11. Find the volume of the solid generated by revolving the region bounded by the graphs of the equations about the x-axis.

$$y = \sqrt{25 - x^2}, \quad y = 4$$

A. $20\pi/3$

B. 12π

C. 18π

D. $55\pi/2$

E. 36π

12. A 100 Liter tank contains 10 Kilograms of salt dissolved in 60 Liters of water. A solution of water and salt with concentration 0.1 Kilograms per Liter is flowing into the tank at a rate of 5 Liters per Minute. The solution in the tank is well-stirred and flows out at a rate of 3 Liters per Minute. Let $y(t)$ be the amount of salt in the tank in Kilograms and t is time in Minutes. Which of the following is $\frac{dy}{dt}$?

A. $\frac{dy}{dt} = 600 - \frac{5}{100+2t}y(t)$

B. $\frac{dy}{dt} = \frac{1}{2} - \frac{3}{60+2t}y(t)$

C. $\frac{dy}{dt} = \frac{1}{2} - \frac{3}{100+2t}y(t)$

D. $\frac{dy}{dt} = 600 - \frac{5}{60-t}y(t)$

E. $\frac{dy}{dt} = 0.3 - \frac{3}{100+t}y(t)$

MA 16020 Exam 1 – Answer Key

Question Number	Green Version Form 01
1	B
2	D
3	A
4	C
5	D
6	E
7	A
8	D
9	C
10	E
11	E
12	B

The exam is worth 120 points

Your score = #correct * 10 points