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

$V = \pi r^2 h$

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

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. Find the particular solution of the differential equation $\dfrac{dy}{dx} = \dfrac{2x+1}{3y^2}$ such that $y = 2$ when $x = 0$.

   A. $y = (x^2 + x + 2)^{1/3}$

   B. $y = x^{2/3} + x^{1/3} + 2$

   C. $y = (x^2 + x + 8)^{1/3}$

   D. $y = x^{2/3} + x^{1/3} + 8$

   E. $y = (x^2 + x)^{1/3}$

2. Evaluate the indefinite integral:

$$\int x^{-1} \sin(\ln(2x))\, dx$$

   A. $2\cos(\ln(2x)) + C$

   B. $\cos(\ln(2x)) + C$

   C. $-\dfrac{1}{2}\cos(\ln(2x)) + C$

   D. $-\cos(\ln(2x)) + C$

   E. $-2\cos(\ln(2x)) + C$

3. Solve the initial-value problem

$$y' + \frac{1}{x}y = x^2$$
$$y(1) = 2.$$

   A. $y = \frac{x^4}{4} + \frac{7}{4}$

   B. $y = \frac{x^3}{3} + \frac{5}{3x}$

   C. $y = \frac{x^3}{4} + \frac{7}{4x}$

   D. $y = \frac{x^3}{4} + \frac{7}{4}$

   E. $y = \frac{x^3}{3} + \frac{7}{4x}$

4.

$$\begin{cases} s''(t) = 32\sin(4t+\pi) \\ s(0) = 9,\ s'(0) = 5 \end{cases}$$

Find $s(t)$.

A. $-2\sin(4t+\pi) - 12t + 9$

B. $-2\sin(4t+\pi) - 3t + 9$

C. $-2\sin(4t+\pi) + 13t + 9$

D. $2\sin(4t+\pi) + 13t + 9$

E. $2\sin(4t+\pi) + 52t + 9$

5. Find $f(x)$ if

$$\int (x^2+4x)^4 f(x)dx = \frac{1}{10}(x^2+4x)^5 + C$$

A. $f(x) = x^2 + 4x$

B. $f(x) = x + 2$

C. $f(x) = 4x + 8$

D. $f(x) = 2x + 4$

E. $f(x) = \frac{1}{3}x^3 + 2x^2$

6. Find the general solution of the differential equation

$$y^2dx + (x-1)^2dy = 0$$

A. $\dfrac{1}{x-1} + \dfrac{1}{y} = C$

B. $\frac{1}{3}y^3 + \frac{1}{3}(x-1)^3 = C$

C. $\ln(x-1)^2 + \ln y^2 = C$

D. $2y + 2(x-1) = C$

E. $\dfrac{1}{(x-1)^3} + \dfrac{1}{y^3} = C$

7. If $y' + (\tan x)y = \cos x$ for the interval $0 < x < \frac{\pi}{2}$ then $y =$

A. $x\cos x + C$

B. $\cos^2 x - x + C$

C. $\ln(\cos^2 x + 1) + C$

D. $x\cos x + C\cos x$

E. $\cot^2 x + \sec x + C$

8. For some positive number a, the region under

$$y = \sqrt{1 + \frac{x}{3}}$$

and over the interval $0 < x < a$ has an area of 16. Determine the value of a, correct to 2 decimal places.

A. 2.52

B. 8.26

C. 9.00

D. 9.98

E. 22.65

9. The general solution to the differential equation:

$$t\frac{dy}{dt} = t^3 + 3t^3 y$$

is $y =$

A. $-\frac{1}{3} + Ce^{t^3}$

B. $\frac{1}{3} + Ce^{-t^3}$

C. $\frac{1}{3} + Ce^{t^3}$

D. $-3 + Ce^{t^3}$

E. $3 + Ce^{-t^3}$

10. The rate of change of the number of coyotes $N(t)$ in a population is directly proportional to $650 - N(t)$, where t is the time in years. That is,

$$\frac{dN}{dt} = k(650 - N).$$

When $t = 0$, the population is 300, and when $t = 2$, the population has increased to 500. Find the population when $t = 3$. Round your answer to the nearest whole number.

A. 483

B. 515

C. 494

D. 552

E. 460

11. The marginal revenue from the sale of q units is given by $R'(q) = 20 + 4.5qe^{-0.1q^2}$ dollars per unit. Assuming there is no revenue for selling zero units, what is the revenue from selling 100 units?

A) 1977.50 dollars

B) 22.50 dollars

C) 2022.50 dollars

D) 42.50 dollars

E) 2000.00 dollars

12. Given the inital value problem

$$\frac{dy}{dx} = e^{3\ln x - y}, y(0) = 0$$

find the value of $y(2)$.

A. $\ln 5$

B. $\ln 7$

C. $\ln 10$

D. $\ln 17$

E. $\ln 20$

13. Find the general solution to the differential equation:

$$4x^3y + x^4y' = 2\sec^2 x \tan x$$

A. $y = x^4 \tan^2 x + C$

B. $y = e^{x^4} \tan^2 x + C$

C. $y = e^{x^4}(\tan^2 x + C)$

D. $y = x^{-4} \tan^2 x + C$

E. $y = x^{-4}(\tan^2 x + C)$

14. A barrel is filled with water at 6am one morning, but due to a small crack, the water leaks out of the barrel at a rate of

$$Q'(t) = \frac{2t^2+1}{t+1}$$

ml per hour, where t is the number of hours after 6am. How much water, in ml, leaks out of the barrel between 7am and 9am?

A. $76/45$

B. $13/4$

C. $3\ln(2)+4$

D. $6\ln(2)$

E. $3\ln(9/7)+24$

15. The current $I(t)$ of a generator satisfies the differential equation:

$$2\frac{dI}{dt} + RI = E$$

If the generator supplies a constant voltage of $E = 12$ volts, the resistance is $R = 40$ ohms, and the initial voltage is $I(0) = 1$ Amp, then $I(t) =$?

A. $\frac{1}{5}(3+2e^{-40t})$

B. $\frac{1}{5}(3+7e^{-40t})$

C. $\frac{1}{5}(3+2e^{-20t})$

D. $\frac{1}{10}(3+7e^{-40t})$

E. $\frac{1}{10}(3+7e^{-20t})$

MA 16020 Exam 1 – Answer Key

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

The exam is worth 120 points

Your score = #correct * 8 points