MA 16010 Exam 1 Summer 2014

Student's Name: _____

Student's ID Number: _____

MA 16010 Sections:

9:50-10:50am Section 002

11:00am-noon Section 001

Instructions:

1. **Do NOT turn the page until told to do so**.
2. Fill in your name and student ID in the space provided above.
3. On the scantron, fill in your name, section number, student ID. Leave the test/quiz number blank. Sign your name.
4. There are 12 problems and a total of 7 pages (including this cover page). The maximum possible score for this exam is 100, and each problem is worth the same points.
5. You can use the available space below a question or at the back of each page for your work. Turn in BOTH the scantron and the exam when you leave. Note: **you will be graded ONLY based on your scantron answer sheet**.
6. Only a one-line display scientific calculator is allowed. NO other electronic devices are allowed. No books or notes are allowed.
7. You will have 60 minutes to complete the exam.
8. **Keep your eyes on your own exam please. Try to cover your bubbled-in scantron answers.**
9. **Good luck!**

MA 16010 - Exam 1

1. Which function below has a period of 4π, a maximum of 25.5 and a minimum of 19.5?

   A. $y = -3\sin 0.5x + 19.5$

   B. $y = 3\cos 0.5x + 25.5$

   C. $y = -3\sin 0.5\pi x - 22.5$

   D. $y = 3\cos 2x - 19.5$

   E. $y = 3\cos 0.5x + 22.5$

2. Find the domain of $f(x) = \dfrac{3x}{2e^x - 4e^{-x}}$.

   A. $(-\infty, \ln 2) \cup (\ln 2, \infty)$

   B. $(-\infty, \frac{1}{2}\ln 2) \cup (\frac{1}{2}\ln 2, \infty)$

   C. $(-\infty, \ln 4) \cup (\ln 4, \infty)$

   D. $(-\infty, \ln \frac{1}{2}) \cup (\ln \frac{1}{2}, \infty)$

   E. $(-\infty, 2\ln \frac{1}{2}) \cup (2\ln \frac{1}{2}, \infty)$

3. Find all real solutions of the equation $\sin(3x) = -\frac{1}{2}$.

   A. $\frac{7\pi}{18} + \frac{2\pi n}{3}, \frac{11\pi}{18} + \frac{2\pi n}{3}$; n is an integer
   B. $\frac{21\pi}{6} + \frac{2\pi n}{3}, \frac{33\pi}{6} + \frac{2\pi n}{3}$; n is an integer
   C. $\frac{7\pi}{18} + 2\pi n, \frac{11\pi}{18} + 2\pi n$; n is an integer
   D. $\frac{7\pi}{9} + 2\pi n, \frac{11\pi}{9} + 2\pi n$; n is an integer
   E. $\frac{5\pi}{18} + \frac{2\pi n}{3}, \frac{7\pi}{18} + \frac{2\pi n}{3}$; n is an integer

4. Find the limit:

$$\lim_{x \to 2} \frac{\sqrt{4x+8}}{x^2+1}$$

   A. $\frac{4}{5}$
   B. 1
   C. $\frac{16}{5}$
   D. 4
   E. $\frac{2}{3}$

5. $f(x) = \begin{cases} x+2 & : x < -1 \\ -x-2 & : x \geq -1 \end{cases}$

Choose the number of correct statements below.

I. f is not continuous at $x = -1$.

II. $\lim_{x \to -1^+} f(x) = 1$.

III. $\lim_{x \to -1} f(x) = 1$.

IV. $\lim_{x \to -1^-} f(x) \neq \lim_{x \to -1^+} f(x)$.

A. None of the above statements is true.

B. Only one of the above statements is true.

C. Only two of the above statements are true.

D. Only three of the above statements are true.

E. All of the above statements are true.

6. Which of the following function has a **non-removable** discontinuity at $x = -3$?

A. $y = x + 3$

B. $y = \dfrac{x^2 + 3x}{x + 3}$

C. $y = \dfrac{x + 3}{x - 3}$

D. $y = \dfrac{x + 3}{3 - x}$

E. $y = \dfrac{x - 3}{x^2 - 9}$

7. A ball is thrown straight up from the top of a 64-foot building with an initial velocity of 32 feet per second. Use the position function below for free-falling objects and find its velocity after 2 seconds.

$$s(t) = -16t^2 + v_0 t + s_0$$

A. -32 ft/sec

B. 64 ft/sec

C. -16 ft/sec

D. 48 ft/sec

E. -64 ft/sec

8. Which of following does **NOT** equal to positive infinity $(+\infty)$?

A. $\lim_{x \to 0} \frac{1}{x^2}$

B. $\lim_{x \to 1^+} \frac{1}{x-1}$

C. $\lim_{x \to 3^+} \frac{x}{\sqrt{x^2-9}}$

D. $\lim_{x \to 2^-} \frac{x+2}{x-2}$

E. $\lim_{x \to 1} \frac{1}{(x-1)^2}$

9. A student used the limit process to find the derivative of $f(x) = \dfrac{x^2}{2}$ and his work is shown below. Which of the following statements is true?

$$\begin{aligned} f'(x) &= \lim_{h\to 0} \frac{\dfrac{(x+h)^2}{2} - \dfrac{x^2}{2}}{h} && (1)\\ &= \lim_{h\to 0} \frac{x^2+2xh+h^2-x^2}{2h} && (2)\\ &= \lim_{h\to 0} \frac{2xh+h^2}{2h} && (3)\\ &= \lim_{h\to 0} (x+h^2) && (4)\\ &= x && (5) \end{aligned}$$

A. He made a mistake in Line (1).
B. He made a mistake in Line (2).
C. He made a mistake in Line (3).
D. He made a mistake in Line (4).
E. He made a mistake in Line (5).

10. Find the equation of the tangent line to the graph of $g(x) = \dfrac{x^2 + 32\sqrt{x}}{8}$ at $x = 4$.

A. $y = 5x - 30$
B. $y = 2x + 2$
C. $y = 5x - 10$
D. $y = 2x - 18$
E. $y = 2x + 10$

11. Find the derivative of $y = (\sin x + \tan x)e^x$.

    A. $y' = (\cos x + \sec^2 x)e^x$

    B. $y' = (\sin x + \cos x + \tan x + \sec x)e^x$

    C. $y' = (\sin x + \cos x + 2\tan x)e^x$

    D. $y' = (\sin x + \cos x + \tan x + \sec^2 x)e^x$

    E. $y' = (\sin x + \cos x + \tan x + \sec x \tan x)e^x$

12. The population P, in thousands, of a small city is given by

$$P(t) = 10 + \frac{50t}{2t^2 + 9}$$

    where t is the time in years. What is the rate of change of the population at $t = 2$ yr? Round your answer to the third decimal place.

    A. -1.557 thousand per year

    B. 3.214 thousand per year

    C. 0.173 thousand per year

    D. 2.941 thousand per year

    E. 5.882thousand per year