MA 16500
EXAM 1 INSTRUCTIONS
VERSION 01
September 19, 2012

Your name _____ Your TA's name _____

Student ID # _____ Section # and recitation time _____

1. You must use a #2 pencil on the scantron sheet (answer sheet).

2. Check that the cover of your question booklet is GREEN and that it has VERSION 01 on the top. Write 01 in the TEST/QUIZ NUMBER boxes and blacken in the appropriate spaces below.

3. On the scantron sheet, fill in your TA's name (NOT the lecturer's name) and the course number.

4. Fill in your NAME and PURDUE ID NUMBER, and blacken in the appropriate spaces.

5. Fill in the four-digit SECTION NUMBER.

6. Sign the scantron sheet.

7. Blacken your choice of the correct answer in the spaces provided for each of the questions 1–12. Do all your work on the question sheets. Show your work on the question sheets. Although no partial credit will be given, any disputes about grades or grading will be settled by examining your written work on the question sheets.

8. There are 12 questions, each worth 8 points. The maximum possible score is
$8 \times 12 + 4$ (for taking the exam) $= 100$ points.

9. NO calculators, electronic device, books, or papers are allowed. Use the back of the test pages for scrap paper.

10. After you finish the exam, turn in BOTH the scantron sheets and the exam booklets.

11. If you finish the exam before 7:25, you may leave the room after turning in the scantron sheets and the exam booklets. If you don't finish before 7:25, you should REMAIN SEATED until your TA comes and collects your scantron sheets and exam booklets.

Questions

1. Solve the following equations (a) and (b) for x.

(a) $\ln(\ln x) = 3$

(b) $e^{5x} = e^{15} \cdot e^{2x}$

A. (a) e^e (b) 3

B. (a) e^e (b) 4

C. (a) e^{e^3} (b) 4

D. (a) e^e (b) $(\ln 15)/3$

E. (a) e^{e^3} (b) 5 (correct)

2. Find a formula for the inverse of the function

$$f(x) = \frac{6x-1}{2x+9}.$$

A. $f^{-1}(x) = \frac{-9x-1}{2x-6}$ (correct)

B. $f^{-1}(x) = \frac{-9y-1}{2y-6}$

C. $f^{-1}(x) = \frac{2x+9}{6x-1}$

D. $f^{-1}(x) = \frac{9x+1}{2x-6}$

E. $f^{-1}(x) = \ln(6x-1) - \ln(2x-6)$

3. Find the domain of the function

$$\frac{1}{\sqrt[4]{2+\sqrt[3]{5x-3}}}.$$

A. $(-\infty,-1)\cup(-1,\infty)$

B. $(-1,\infty)$ (correct)

C. $[-1,\infty)$

C. $(-\infty,-1)$

E. $(-\infty,\infty)$

4. Find the number of values of x in the interval $[0,2\pi]$ that satisfy the equation

$$\sin x = \cos(2x).$$

HINT: $\cos(2x) = 1 - 2\sin^2 x$

A. 0

B. 1

C. 2

D. 3 (correct)

E. 4

5. Compute the following limits (a) and (b)

(a) $\lim_{x\to 3}(2x + |x - 3|)$

(b) $\lim_{t\to 0}\left(\frac{1}{t} - \frac{1}{t^2+t}\right)$

A. (a) 3 (b) 0

B. (a) 6 (b) 1 (correct)

C. (a) 6 (b) ∞

D. (a) 6 (b) Does Not Exist

E. (a) 2 (b) 2

6. Compute $\lim_{x\to 0} x^4 \cos\left(\frac{2}{x}\right)$.

A. 1

B. 2

C. 4

D. 0 (correct)

E. Does Not Exist

7. Consider the following function

$$f(x) = \begin{cases} \frac{x^2-ax}{x^2-1} & \text{if} \quad x \neq 1 \\ b & \text{if} \quad x = 1. \end{cases}$$

Determine the values of a and b so that f is continuous everywhere.

A. $a = 1, b = 1$

B. $a = 1, b = 1/2$ (correct)

C. $a = -1, b = -1/2$

D. $a = -1, b = 1$

E. $a = 0, b = 0$

8. Find the exact value for $\tan\left(-\pi \cdot e^{-\ln 4}\right)$.

A. 2

B. 4

C. 0

D. 1

E. -1(correct)

9. Compute the following limit

$$\lim_{h\to 0} \frac{\sqrt{8+h} - 2\sqrt{2}}{h}.$$

A. $\frac{1}{\sqrt{2}}$

B. $\frac{1}{2\sqrt{2}}$

C. $\frac{1}{4\sqrt{2}}$ (correct)

D. $\frac{3}{2\sqrt{2}}$

E. $\frac{3}{4\sqrt{2}}$

10. Find the equation of the tangent line to the curve $y = 2\sqrt{x}$ that is parallel to the line $y = \frac{1}{2}x + 3$.

A. $y = \frac{1}{2}x + 4$

B. $y = 2x - 4$

C. $y = x$

D. $y = -\frac{1}{2}x + 6$

E. $y = \frac{1}{2}x + 2$ (correct)

11. Find the derivative of the following function at the given point

(a) $f(x) = \frac{\sqrt{x}}{2x+1}$ at $x = 1$

(b) $h(\theta) = \frac{\cos\theta}{2-\sin\theta}$ at $\theta = \frac{\pi}{2}$

A. (a) - 1/9 (b) 1/2

B. (a) - 1/9 (b) 1

C. (a) - 1/18 (b) 1

D. (a) - 1/18 (b) -1 (correct)

E. (a) - 1/6 (b) 1/2

12. Find $f''(1)$ when $f(x) = 2x^{\frac{3}{2}}e^x$.

A. $8e$

B. $9e$

C. $\frac{13e}{2}$

D. $\frac{17e}{2}$

E. $\frac{19e}{2}$ (correct)