MA 16500
EXAM 2 INSTRUCTIONS
VERSION 01
October 16, 2013

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. Find $f'(0)$ for $f(x) = \sqrt{1 + 3e^{2x}}$.

A. $\frac{3}{2}$ (correct)

B. 3

C. $\frac{1}{4}$

D. $\frac{3}{4}$

E. 6

2. Let $f(x) = \sin\left(\frac{1}{h(x)}\right)$. Assume $h(1) = 4$ and $h'(1) = 5$. Evaluate $f'(1)$.

A. $\frac{5\cos(\frac{1}{4})}{16}$

B. $\frac{-5\cos(\frac{1}{4})}{16}$ (correct)

C. $\frac{\cos(\frac{1}{4})}{-16}$

D. $5\cos(\frac{1}{4})$

E. $\frac{5\cos(\frac{1}{4})}{4}$

3. The derivative of $(\cos x)^x$ is:

A. $(\cos x)^x[-x\tan x + \ln(\cos x)]$ (correct)
B. $(\cos x)^x \cdot [x\tan x + \ln(\cos x)]$
C. $(\cos x)^x[x\sec x + \ln(\cos x)]$
D. $-x(\cos x)^{x-1}(\sin x)$
E. $x(\cos x)^{x-1} \cdot \sin x$

4. Determine the exact value for

(a) $\sec(\tan^{-1} 4)$
(b) $\sin^{-1}\left(\sin(\frac{5\pi}{6})\right)$.

A. (a) $\dfrac{1}{\sqrt{17}}$ (b) $\frac{5\pi}{6}$
B. (a) $\dfrac{1}{\sqrt{17}}$ (b) $\frac{\pi}{6}$
C. (a) $\sqrt{17}$ (b) $\frac{5\pi}{6}$
D. (a) $\sqrt{17}$ (b) $\frac{\pi}{6}$ (correct)
E. (a) $\sqrt{17}$ (b) $\frac{1}{2}$

5. The position of a particle on a number line is given by $s = f(t) = t^3 - 3t^2$. What is the total distance traveled by the particle from $t = 0$ to $t = 5$?

A. 58 (correct)
B. 54
C. 50
D. 46
E. 42

6. Use a linear approximation (or differentials) to estimate $\sqrt[3]{8.3}$.

A. $2 + \frac{1}{10}$
B. $2 + \frac{1}{20}$
C. $2 + \frac{1}{40}$ (correct)
D. $2 + \frac{3}{40}$
E. $2 + \frac{1}{4}$

7. Evaluate $\dfrac{d}{dx}(\cosh(\ln x))$ when $x = 2$.

A. $\dfrac{e^4 - 1}{4e^2}$

B. $\dfrac{e^4 - 1}{2e^2}$

C. 0

D. $\dfrac{3}{8}$ (correct)

E. $\dfrac{5}{8}$

8. Find the formula for $\sin(2\tan^{-1} x)$.

A. $\frac{1}{\sqrt{1+x^2}}$

B. $\frac{x}{\sqrt{1+x^2}}$

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

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

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

9. Use implicit differentiation to compute $\dfrac{dy}{dx}$ at $(-1, 1)$ for the curve given by $x^2 + 5xy + y^4 + 3 = 0$.

A. 3 (correct)

B. -2

C. -3

D. 2

E. $\dfrac{2}{5}$

10. A ladder 13 feet long is leaning against a wall. If the base of the ladder slides away from the wall at $\frac{1}{2}$ ft./sec, how fast does the top of the ladder drop when the base is 5 feet from the wall?

A. $\dfrac{6}{5}$ ft./sec.

B. $\dfrac{5}{24}$ ft./sec. (correct)

C. 5 ft./sec.

D. 2 ft./sec.

E. 1 ft./sec.

11. A trough is 10 ft. long and its ends have the shape of isosceles triangles that are 2 ft. across the top and have a height of 1 ft.. If the trough is being filled with water at a rate of 15 ft.^{3}/min, how fast is the water level rising when the water is 9 inches deep ?

A. 1/2 ft./min

B. 1/6 ft./min

C. 1/12 ft./min

D. 1 ft./min (correct)

E. 2 ft./min

12. A balloon is rising vertically from a point on the ground that is 60 ft. from a ground–level observer. The angle of elevation θ between the observer and the balloon (see the sketch below) is increasing at a rate of $\frac{1}{30}$ radians/sec. How fast is the balloon rising when the angle of elevation is $\frac{\pi}{3}$?

A. 1 ft./sec.

B. 2 ft./sec.

C. 4 ft./sec.

D. $\sqrt{3}$ ft./sec.

E. 8 ft./sec. (correct)