MA 165 Exam 2 01 Fall 2011

NAME ____

10-DIGIT PUID ______________________________________

REC. INSTR. __________________ REC. TIME __________________

LECTURER ____

INSTRUCTIONS:

1. There are 7 different test pages (including this cover page). Make sure you have a complete test.
2. Fill in the above items in print. Also write your name at the top of pages 2–7.
3. Do any necessary work for each problem on the space provided or on the back of the pages of this test booklet. Circle your answers in this test booklet. No partial credit will be given.
4. No books, notes, calculators or any electronic devices may be used on this exam.
5. Each problem has 8 points assigned. 4 points are given for taking the exam. The maximum possible score is 96+4=100 points.
6. Using a #2 pencil, fill in each of the following items on your scantron sheet:
   (a) On the top left side, write your name (last name, first name), and fill in the little circles.
   (b) On the bottom left side, under SECTION NUMBER, put 0 in the first column and then enter the 3-digit section number. For example, for section 016 write 0016. Fill in the little circles.
   (c) On the bottom, under TEST/QUIZ NUMBER, write 01 and fill in the little circles.
   (d) On the bottom, under STUDENT IDENTIFICATION NUMBER, write in your 10–digit PUID, and fill in the little circles.
   (e) Using a #2 pencil, put your answers to questions 1–12 on your scantron sheet by filling in the circle of the letter of your response. Double check that you have filled in the circles you intended. If more than one circle is filled in for any question, your response will be considered incorrect. Use a #2 pencil.
7. After you have finished the exam, hand in your scantron sheet and your test booklet to your recitation instructor.

(8 pts) 1. If $F(\theta) = \sin^{-1}(\sqrt{\sin\theta})$, then $F'(\theta) =$

A. $\dfrac{\cos\theta}{2\sqrt{1-\sin\theta}\sqrt{\sin\theta}}$

B. $\dfrac{\cos\theta}{2\sin\theta\sqrt{1-\sin\theta}}$

C. $\dfrac{-\cos\theta}{2(1-\sin\theta)\sqrt{\sin\theta}}$

D. $\dfrac{\cos^2\theta}{2\sqrt{1-\sin\theta}\sqrt{\sin\theta}}$

E. $\dfrac{-\cos\theta}{2\sin\theta\sqrt{1-\sin\theta}}$

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

A. $\sqrt{1-x^2}$

B. $\dfrac{\sqrt{1-x^2}}{x}$

C. $\dfrac{x}{\sqrt{1-x^2}}$

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

E. $\dfrac{x}{\sqrt{1+x^2}}$

(8 pts) 3. If $f(x) + x^2[f(x)]^3 = 10$ and $f(1) = 2$, then we compute the value of $f'(1)$ to be

A. $-\dfrac{16}{13}$

B. $\dfrac{16}{13}$

C. 16

D. 0

E. 13

(8 pts) 4. Find the slope of the tangent line to the curve $y\sin(2x) = x\cos(2y)$ at $\left(\dfrac{\pi}{2}, \dfrac{\pi}{4}\right)$.

A. $\dfrac{1}{2}$

B. $-\dfrac{1}{2}$

C. 0

D. $\dfrac{\pi}{2}$

E. $-\dfrac{\pi}{2}$

(8 pts) 5. If $y = x^{\ln x}$, then at $x = e$ the value of $\dfrac{dy}{dx}$ is

A. 1

B. 2

C. 3

D. e

E. 0

(8 pts) 6. If we use the linear approximation for $f(x) = \sqrt[3]{x}$ at $a = 1000$, then the estimate for the number $\sqrt[3]{1001}$ is

A. 10.1

B. 10

C. 10.2

D. $\dfrac{301}{30}$

E. $\dfrac{3001}{300}$

(8 pts) 7. Which of the following is the derivative of $\ln(2\cosh x)$?

A. $-2\tanh x$

B. $-\coth x$

C. $2\sinh x$

D. $\coth x$

E. $\tanh x$

(8 pts) 8. Evaluate dy if $y = x^3 - 2x^2 + 1$, $x = 2$ and $dx = 0.2$.

A. 0.6

B. 0.8

C. 1.0

D. 1.2

E. 1.4

(8 pts) 9. A snowball melts so that its surface area decreases at a rate of 1 cm^2/min. When the diameter is 10 cm, the diameter is decreasing at a rate of

A. $\dfrac{1}{\pi}$ cm/min

B. $\dfrac{1}{10\pi}$ cm/min

C. $\dfrac{1}{5\pi}$ cm/min

D. $\dfrac{1}{20\pi}$ cm/min

E. $\dfrac{5}{\pi}$ cm/min

(8 pts) 10. A ladder 10 ft long rests against a vertical wall. If the bottom of the ladder slides away from the wall at a rate of 1 ft/sec, how fast is the angle between the ladder and ground decreasing when the bottom of the ladder is 6 ft away from the wall ?

A. $\dfrac{1}{2}$ rad/sec

B. $\dfrac{1}{4}$ rad/sec

C. $\dfrac{1}{8}$ rad/sec

D. $\dfrac{1}{16}$ rad/sec

E. $\dfrac{1}{32}$ rad/sec

(8 pts) 11. Water is leaking out of an inverted conical tank at a rate of 10000 cm^3/min. At the same time water is pumped into the tank at a constant rate of r cm^3/min. The tank has height 12 m and the diameter of the top is 4 m. If water is rising at a rate of 20 cm/min when the height is 2 m, what is the constant rate r?

A. $10000\left[1-\dfrac{\pi}{36}\right]\ \text{cm}^3/\text{min}$

B. $\left[-10000+\dfrac{20000\pi}{9}\right]\ \text{cm}^3/\text{min}$

C. $\left[10000-\dfrac{800000\pi}{9}\right]\ \text{cm}^3/\text{min}$

D. $10000\left[1+\dfrac{20\pi}{9}\right]\ \text{cm}^3/\text{min}$

E. $10000\left[1+\dfrac{\pi}{36}\right]\ \text{cm}^3/\text{min}$

(8 pts) 12. A light house is located on a small island, 4 km from the nearest point P on a straight shoreline, and its light makes 5 rotations per minute (10π rad/min). How fast is the beam of light moving along the shoreline when it is 2 km from P?

A. 50π km/min

B. 200π km/min

C. 20π km/min

D. $(20\sqrt{5})\pi$ km/min

E. $(40\sqrt{5})\pi$ km/min