MATH 161 & 161E – SECOND EXAM – FALL 2002
OCTOBER 24, 2002

STUDENT NAME:

STUDENT ID:

RECITATION INSTRUCTOR :

INSTRUCTIONS:

1. This test booklet has 7 pages including this page.
2. Fill in your name, your student ID number, and your recitation instructor's name above.
3. Use a number 2 pencil on the mark-sense sheet (answer sheet).
4. On the mark-sense sheet, fill in the recitation instructor's name and the course number.
5. Fill in your name and student ID number, blacken the appropriate spaces, and sign the mark-sense sheet.
6. Mark the division and section number of your class and blacken the corresponding circles, including the circles for the zeros. If you do not know your division and section number ask your instructor.
7. There are 12 questions, each worth 8 points. Blacken your choice of the correct answer in the spaces provided. Turn in BOTH the answer sheet and the question sheets to your instructor when you are finished.
8. No books, notes, or calculators may be used.

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1) A cubic water tank with sides measuring $5\,\text{ft}$ is being filled at a rate $3\,\text{ft}^3/\text{s}$. How fast is the water rising ?

A) $1\,\text{ft}/\text{s}$

B) $2\,\text{ft}/\text{s}$

C) $\frac{5}{9}\,\text{ft}/\text{s}$

D) $\frac{3}{25}\,\text{ft}/\text{s}$

E) $\frac{2}{25}\,\text{ft}/\text{s}$

2) The value of

$$\lim_{x \to 8} \frac{x^{\frac{2}{3}} - 4}{x - 8} \text{ is equal to}$$

A) 0

B) $\frac{1}{3}$

C) $\frac{2}{3}$

D) 1

E) $\frac{4}{3}$

3) If

$$f(x) = e^{e^{(x^2 + x)}},$$

then $f'(0)$ is equal to

A) e

B) e^e

C) e^2

D) e^3

E) 1

4) A number c in the interval $(0,2)$ for which the line tangent to the graph of $f(x) = x^3 + 1$ at $x = c$ is parallel to the line $y = 4x + 1$ is:

A) $c = \sqrt{8/3}$

B) $c = \sqrt{4/3}$

C) $c = 1$

D) $c = \sqrt{1/3}$

E) $c = \frac{1}{5}$

5) The value of

$$\lim_{x \to 2} \frac{\sin(x - 2)}{x^2 + 3x - 10} \quad \text{equals:}$$

A) $\frac{1}{4}$

B) $\frac{1}{5}$

C) 1

D) $\frac{1}{2}$

E) $\frac{1}{7}$

6) Let $f(x)$ be a differentiable function at $x = 3$ satisfy $f(3) = 2$. Let $y(x) = (f(x))^2$ be such that $y'(3) = -8$. Then $f'(3)$ is equal to:

A) $-\frac{4}{3}$

B) -2

C) $-\frac{8}{3}$

D) -4

E) -8

7) If $f(x) = \ln\left[\frac{(x+1)^{\frac{1}{3}}(x^2+1)^{\frac{1}{3}}}{x^3+1}\right]$, then $f'(1)$ is equal to:

A) $-\frac{1}{2}$

B) $\frac{3}{2}$

C) $-\frac{1}{3}$

D) -1

E) 1

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8) The slope of the tangent line to the curve $x^2y+\sin(xy)+y^2-2x=1$ at $(0,1)$ is:

A) $\frac{1}{2}$

B) $\frac{-1}{2}$

C) 0

D) 1

E) 3

9) If $y(x) = \tan^{-1}(1+x^2)$, then $y'(1)$ is equal to

A) $\frac{1}{5}$

B) $-\frac{1}{2}$

C) $\frac{2}{5}$

D) $\frac{2}{3}$

E) 1

10) If $x^2 + y^2 = 2$, and $y > 0$, then $y''(\sqrt{2})$ is equal to:

A) $\sqrt{2}$

B) $2\sqrt{2}$

C) $-\sqrt{2}$

D) 1

E) 2

11) A bacteria culture grows at a rate proportional to its size. If there were 600 bacteria after two hours and 75000 after five hours, then the initial population was :

A) 75

B) 60

C) 50

D) 40

E) 24

12) A leaking offshore oil rig is the center of a circular oil slick which is growing at the rate of 5 square miles per hour (mph). How fast is the radius of the oil slick changing when the radius of the slick is 0.75 miles?

A) $\frac{25}{3\pi}$

B) $\frac{3\pi}{10}$

C) $\frac{10}{3\pi}$

D) $\frac{3}{40\pi}$

E) $\frac{5}{40\pi}$