

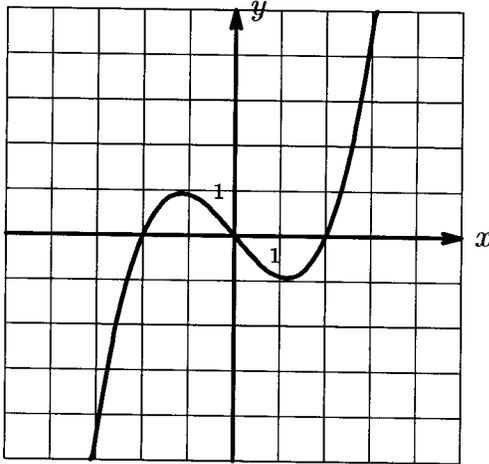
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|-------------------|-----------------------------------|
| _____<br>Name     | _____<br>Student ID Number        |
| _____<br>Lecturer | _____<br>Recitation Instructor    |
|                   | _____<br>Time of Recitation Class |

**Instructions:**

1. The exam has 14 problems, each worth 7 points, for a total of 100 points (that includes 2 bonus points for taking the exam).
2. Please supply all information requested above.
3. Work only in the space provided, or on the backside of the pages.
4. No books, notes, or calculators are allowed.
5. Use a number 2 pencil on the answer sheet. Print your last name, first name, and fill in the little circles. Under "Section Number", print the division and section number of your recitation class and fill in the little circles. Under "Test/Quiz Number" print 02 and fill in the little circles. Similarly, fill in your student ID and fill in the little circles. Also, fill in your recitation instructor's name; the course, MA 161; and the date, Feb. 27, 2002. Be sure to fill in the circles for each of the answers of the 14 exam questions.

1. The curve defined by the equation  $y = \frac{2 - x - x^2}{x^2 + 4}$  has
- A. no asymptotes
  - B. exactly one horizontal asymptote and one vertical asymptote
  - C. exactly one horizontal asymptote and no vertical asymptotes
  - D. exactly one vertical asymptote and no horizontal asymptotes
  - E. exactly two horizontal asymptotes and no vertical asymptote
2. Find an equation of the line tangent to the curve with the equation  $y = \frac{1}{\sqrt{x}}$  at the point where  $x = 3$ .
- A.  $x + 6\sqrt{3}y = 9$
  - B.  $x - 3y = 3 - \sqrt{3}$
  - C.  $\sqrt{3}x + 9y = 6\sqrt{3}$
  - D.  $x + 3y = 3 + \sqrt{3}$
  - E.  $x - 6\sqrt{3}y = -3$

3. For the function  $u$  whose graph is given, arrange the following numbers in decreasing order:  $u'(-3)$ ,  $u'(-2)$ ,  $0$ ,  $u'(0)$ ,  $u'(1)$ .



- A.  $u'(-3), u'(-2), u'(0), u'(1), 0$   
 B.  $u'(-2), u'(0), 0, u'(1), u'(-3)$   
 C.  $0, u'(1), u'(0), u'(-2), u'(-3)$   
 D.  $u'(-3), u'(-2), 0, u'(1), u'(0)$   
 E.  $0, u'(1), u'(0), u'(-2), u'(-3)$

4.  $\lim_{x \rightarrow 1} \frac{x^6 - 1}{x - 1}$  is the derivative of some function  $f$  at some number  $a$ . find  $f$  and  $a$ .

- A.  $f(x) = x^6, a = 1$   
 B.  $f(x) = x^6, a = 0$   
 C.  $f(x) = 6x^5, a = 1$   
 D.  $f(x) = 6x^5, a = 0$   
 E. The limit doesn't exist

5. A ball is thrown upward from the ground with an initial velocity of 160 ft/sec. Its height above the ground, in feet,  $t$  seconds later is given by  $s(t) = 160t - 16t^2$ . Its velocity when  $t = 2$  is

- A. 64 ft/sec
- B. 96 ft/sec
- C. 32 ft/sec
- D. 106 ft/sec
- E. 128 ft/sec

6. The graph of  $f(x) = 2x - e^x$  has a horizontal tangent when  $x =$

- A.  $\frac{e}{2}$
- B.  $\frac{\ln 2}{2}$
- C.  $e^2$
- D.  $e \ln 2$
- E.  $\ln 2$

7. If  $f(x) = |x - 2|$ , then  $f'(2) =$

- A. 0
- B. -1
- C. 1
- D.  $\infty$
- E. Does not exist

8. Let  $f(x) = (x^2 - 3x + 1)\left(\frac{1}{x} - \sqrt{x}\right)$ . Then  $f'(1) =$

- A.  $\frac{3}{2}$
- B.  $\frac{5}{2}$
- C.  $\frac{7}{2}$
- D.  $-\frac{3}{2}$
- E.  $-\frac{5}{2}$

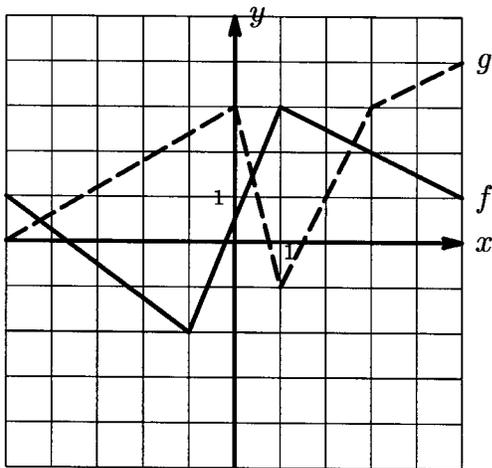
9. If  $g(t) = \frac{t^2}{t + \frac{3}{t}}$  then  $g'(1) =$

- A.  $\frac{1}{2}$
- B.  $-\frac{1}{2}$
- C. 2
- D.  $\frac{5}{8}$
- E.  $\frac{3}{8}$

10. If  $f(x) = \frac{x^3}{g(x)}$  and  $f(2) = 4$ ,  $f'(2) = 3$  and  $g(2) = 2$ , then  $g'(2) =$

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

11. The graphs of  $f$  and  $g$  are shown below. Let  $u(x) = f(x)g(x)$ . Find  $u'(2)$ .



- A. 3
- B.  $\frac{3}{2}$
- C.  $-\frac{3}{2}$
- D.  $-\frac{9}{2}$
- E.  $\frac{9}{2}$

12. If  $y = \tan^{-1}(3x^2)$ , find  $\frac{dy}{dx}$  when  $x = -1$ .

- A.  $\frac{5}{3}$
- B.  $-\frac{3}{5}$
- C.  $\frac{3}{5}$
- D.  $\frac{1}{10}$
- E.  $-\frac{1}{10}$

13. Find  $\frac{dy}{dx}$  if  $4 \cos y \sin x = 2$ .

- A.  $\frac{-\sin y + \cos x}{\sin x + \cos y}$
- B.  $\frac{\cos y \sin x}{\cos x \sin y}$
- C.  $\frac{\cos y \cos x}{\sin y \sin x}$
- D.  $\frac{\cos x \sin y}{\cos y \sin x}$
- E.  $\frac{\cos^2 x}{\sin^2 y}$

14. Let  $y^2 = 5x^4 - x^2$ . Find the slope of the tangent line at the point  $(1, -2)$ .

- A. 9
- B. -9
- C.  $\frac{9}{2}$
- D.  $-\frac{9}{2}$
- E.  $-\frac{9}{4}$