MATH 161 & 161E - SECOND EXAM - SPRING 2003

Student Name:

Student ID:

Recitation Instructor:

Instructions:

1. This test booklet has 8 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. Good luck!

1. $\lim_{x\to\infty} \sqrt{4x^2+3x}-2x$

   (a) 3/8

   (b) $-3/2$

   (c) 4/3

   (d) 3/4

   (e) 3/2

2. Find the equation of the line that is tangent to the curve $y=\sqrt{5+2x}$ at the point $(2,3)$

   (a) $y=\frac{2}{3}x+\frac{5}{3}$

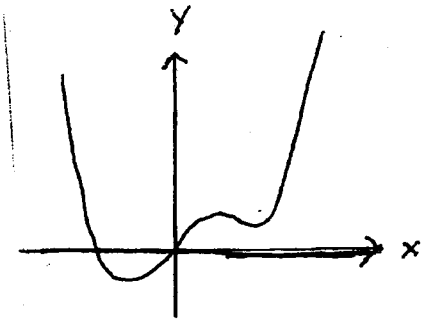
   (b) $y=\frac{1}{6}x+\frac{17}{6}$

   (c) $y=\frac{1}{3}x+3$

   (d) $y=\frac{2}{3}x+3$

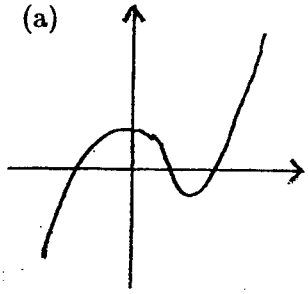
   (e) $y=\frac{1}{3}x+\frac{7}{3}$

3. If the graph of the function $f(x)$ looks like

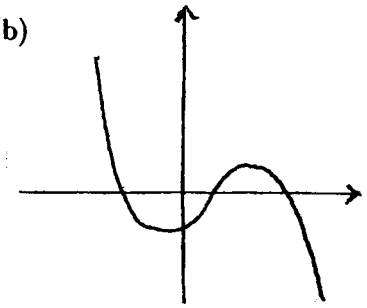


then which of the following is the graph of $f'(x)$?

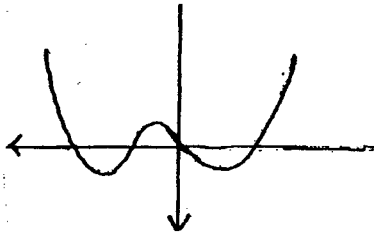
(a)



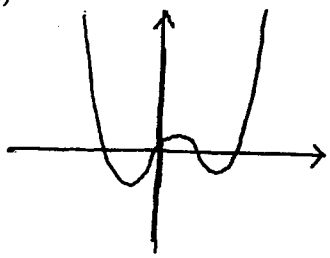
(b)



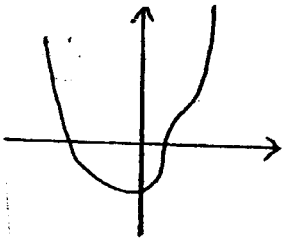
(c)



(d)



(e)



4. If $f(x) = \dfrac{x^2 - x + 2}{x + 2}$, find all x such that $f'(x) = 1$.

   (a) $x = 1 \pm \sqrt{2}$

   (b) $x = \pm\sqrt{2}$

   (c) $x = \dfrac{1}{2}, \dfrac{3}{2}$

   (d) $x = \dfrac{3}{2}$

   (e) Equation has no solution

5. If $f(x) = x\sqrt{x} + \dfrac{8}{\sqrt{x}}$, compute $f'(4)$.

   (a) $\dfrac{5}{2}$

   (b) $\dfrac{7}{2}$

   (c) $\dfrac{3}{2}$

   (d) $3 - \dfrac{1}{2\sqrt{2}}$

   (e) $6 - \dfrac{1}{\sqrt{2}}$

6. A stone is dropped into a lake creating a circular ripple that travels outward at a speed of 2 ft./sec. Find the rate at which the area within the circle is increasing after 2 seconds.

   (a) 8π ft^2/sec

   (b) 16π ft^2/sec

   (c) $\frac{8\pi}{3}$ ft^2/sec

   (d) 32π ft^2/sec

   (e) $\frac{16\pi}{3}$ ft^2/sec

7. If $x^2y^3 + y^2 - x^3 - 20 = 0$, then $\frac{dy}{dx}$ equals

   (a) $3x^2y^2 + 2xy^3 + 2y - 3x^2 = 0$

   (b) $6xy^2 + 2y - 3x^2$

   (c) $\frac{3x^2 - 2xy^3}{3x^2y^2 + 2y}$

   (d) $\frac{3x^2}{3x^2y^2 + 2y}$

   (e) $\frac{3x^2 - 2xy^3}{6x^2y + 2y}$

8. If $f(x) = x^2 \sin^{-1}(10x)$ then $f'(x)$ equals

   (a) $\dfrac{x^2}{\sqrt{1-x^2}}$

   (b) $\dfrac{20x}{\sqrt{1-100x^2}}$

   (c) $\dfrac{10x^2}{\sqrt{1-100x^2}} + 2x \sin^{-1}(10x)$

   (d) $2x \sin^{-1}(10x)$

   (e) None of the above

9. If $y = 3^{2^x}$, then $\dfrac{dy}{dx}$ equals

   (a) $3^{2^x} \ln(3) + 2^x \ln(2)$

   (b) $3^{2^x} \cdot 2^x \ln(2) \ln(3)$

   (c) $3^{2^x} \ln(2) \ln(3)$

   (d) $3^{2^x} \cdot 2^x \ln(3)$

   (e) $2^x \ln(3) \ln(2)$

10. If $f(x) = \ln \sqrt[3]{\frac{e^{3x}+e^{-3x}}{x^2+1}}$ then $f'(x)$ equals

(a) $\dfrac{e^{3x} - e^{-3x}}{e^{3x} + e^{-3x}}$

(b) $\sqrt[3]{\dfrac{x^2+1}{e^{3x} + e^{-3x}}}$

(c) $\dfrac{1}{3}\left[\dfrac{1}{e^{3x} + e^{-3x}} - \dfrac{1}{x^2+1}\right]$

(d) $\dfrac{(e^{3x} - e^{-3x})}{e^{3x} + e^{-3x}} - \dfrac{2x}{3(x^2+1)}$

(e) $\sqrt[3]{\dfrac{x^2+1}{e^{3x} + e^{-3x}}} \cdot \dfrac{e^{3x} - e^{-3x}}{(x^2+1)^2}$

11. One hundred grams of a radioactive substance decays exponentially to 82 grams in seven days. The half life is

(a) $\dfrac{7\ln(2)}{\ln(\frac{100}{82})}$

(b) $\dfrac{7\ln(2)}{\ln(\frac{82}{100})}$

(c) $\dfrac{1}{7}\ln\left(\dfrac{82}{100}\right)$

(d) $\dfrac{1}{7}\ln\left(\dfrac{100}{82}\right)$

(e) None of the above

12. Water is withdrawn from a conical reservoir 8 ft in diameter and 10 feet deep (vertex at bottom) at the constant rate of 5 ft^3/min. How fast is the water level falling when the depth of the water in the reservoir is 5 feet? (Assume Volume formula, $V = \frac{1}{3}\pi r^2 h$).

(a) $\frac{15}{16\pi}$ ft/min

(b) $\sqrt{\frac{3}{\pi}}$ ft/min

(c) $\frac{2}{\pi}$ ft/min

(d) $5\sqrt[3]{\frac{3}{4\pi}}$

(e) $\frac{5}{4\pi}$ ft/min