MA 161 & 161E Exam 3, November 2004

Name _____

Student ID number _____

Lecturer _____

Recitation instructor _____

INSTRUCTIONS:

1. Fill in all the information requested above and on the scantron sheet.
2. This booklet contains 11 problems, each worth 9 points. You get 1 point if you fully comply with instruction 1. The maximum score is 100 points.
3. For each problem circle the answer of your choice, and also mark it on the scantron sheet.
4. Work only on the pages of this booklet.
5. Books, notes, calculators are not to be used on the test.
6. At the end turn in your exam and scantron sheet to your recitation instructor.

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1. B 2. E 3. C 4. B 5. D

6. E 7. A 8. C 9. D 10. A

11. D

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1. A balloon is rising vertically from a point on the ground that is 60 ft from a ground level observer. The angle of elevation between the observer and the balloon is increasing at a rate of 1/10 rad a second when the angle is $\pi/3$ rad. At what rate is the balloon rising at this moment, in ft/sec?

   A. 36

   B. 24

   C. 92

   D. 60

   E. 48

2. Linear approximation gives the approximate value for $\sqrt{79}$

   A. $8\frac{5}{6}$

   B. $9\frac{2}{9}$

   C. $8\frac{3}{4}$

   D. $9\frac{1}{12}$

   E. $8\frac{8}{9}$

3. The function $f(x) = 2x^3 + 3x^2 - 12x + 4$ has

   A. two negative critical numbers.

   B. two positive critical numbers.

   C. one positive and one negative critical number.

   D. three critical numbers, one of which is zero, the other two are positive.

   E. three critical numbers, one of which is zero, the other two are negative.

4. On the interval $[-1, 1]$ the function $h(x) = \dfrac{x^2}{2 + x^2}$ has an absolute

   A. maximum at $x = 0$.

   B. minimum at $x = 0$.

   C. maximum at $x = 1/\sqrt{2}$.

   D. minimum at $x = 1$.

   E. minimum at $x = -1$.

5. If $g(3) = 8$ and $g'(x) \geq 3$ for all x, then

   A. $2 < g(1) < 3$

   B. $8 < g(1) < 10$

   C. $3 < g(1)$

   D. $g(1) \leq 2$

   E. $10 \leq g(1)$

6. Below is the graph of the *derivative* of a function f. The inflection points and absolute minima of f itself, in that order, must be at

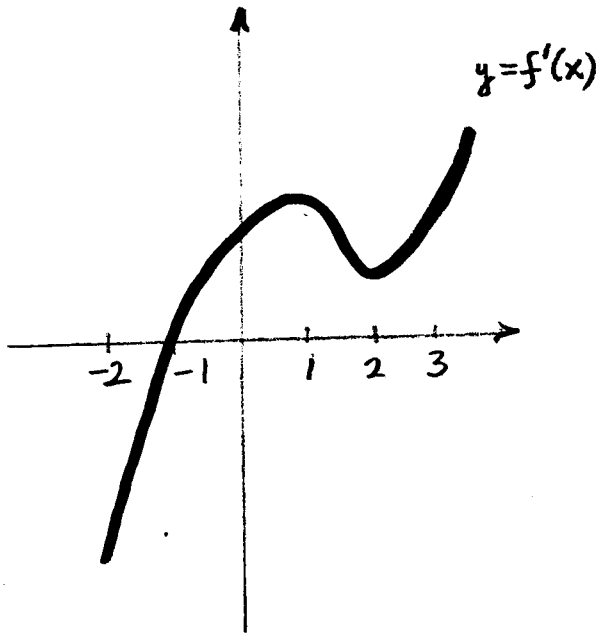
   A. $-1; -2$

   B. $1; -2$ and 2

   C. -1 and $2; 1$

   D. $-1; 2$

   E. 1 and $2; -1$



7. Which is true? The function $x + \sqrt{2}\cos x$ is increasing on the intervals

   A. $(0, \pi/4)$ and $(3\pi/4, 2\pi)$

   B. $(-\pi/4, 0)$ and $(\pi/4, 7\pi/4)$

   C. $(-\pi/4, 0)$ and $(\pi/2, 5\pi/4)$

   D. $(0, \pi/2)$ and $(5\pi/4, 7\pi/4)$

   E. $(0, 3\pi/4)$ and $(5\pi/4, 2\pi)$

8. If $h'(x) = (x-1)^2(x+1)(x-2)$, then the local minima of h are at $x =$

   A. -1

   B. $-1, 1, 2$

   C. 2

   D. 1 and -2

   E. -1 and 2

9. $\lim_{u \to 0} \dfrac{2u + \tan 2u}{\sin u} =$

A. -2

B. 0

C. 1

D. 4

E. ∞

10. $\lim_{z \to 0^+} \sqrt{z} \ln z =$

A. 0

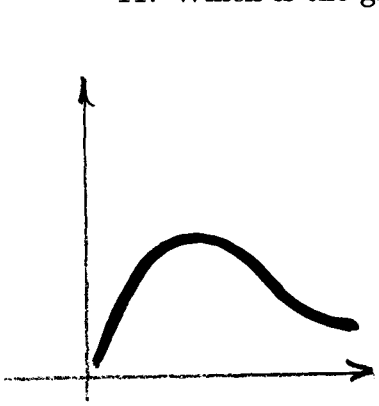
B. 1

C. e

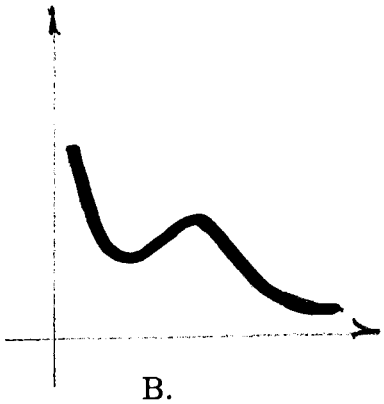
D. $\sqrt{e}$

E. $-\infty$

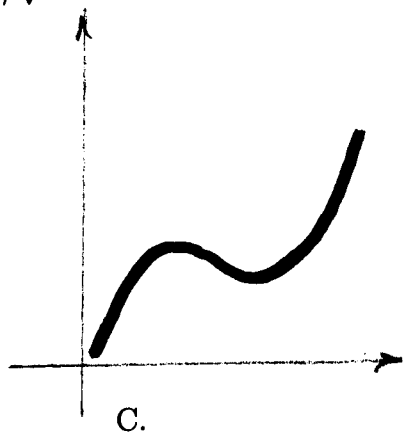
11. Which is the graph of the function $f(x) = 2\sqrt{x} + 1/\sqrt{x}$?



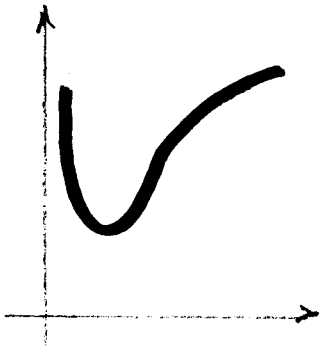
A.



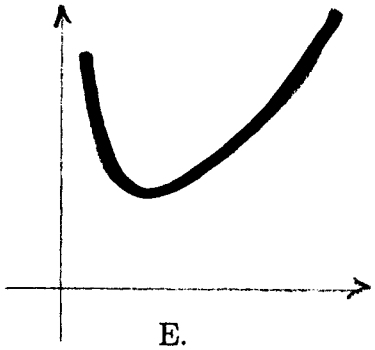
B.



C.



D.



E.