MA 161-161E EXAM 2 SPRING 1999

Name: _____ I.D.#: _____

Section #: _____ TA's Name: _____

1. This package contains 7 pages and 12 problems, problems 1–8 are worth 8 points each and problems 9–12 are worth 9 points each. Correct answers with inconsistent work or no work may not be given credit.

2. Be sure to fill in your name, ID#, Section #, and the name of your recitation instructor.

3. The exam lasts 60 minutes.

4. No books, notes, or calculators, please.

1. Let $f(x) = \dfrac{\sin x}{x^2 - 1}$. Then $f'(2) =$

A. $\dfrac{3\cos 2 - 4\sin 2}{3}$

B. $\dfrac{3\cos 2 + 4\sin 2}{3}$

C. $\dfrac{3\cos 2 - 4\sin 2}{9}$

D. $\dfrac{3\cos 2 + 4\sin 2}{9}$

E. $\dfrac{\cos 2}{4}$

2. Let $f(t) = \ln(\sin(e^t))$. If $t = \ln(\pi/4)$, then $f'(t) =$

A. $\dfrac{\pi}{4}$

B. 1

C. $\dfrac{\pi}{2\sqrt{2}}$

D. 0

E. $\dfrac{\sqrt{2}}{2}$

3. Let $x^2 + 3xy + 2y^2 = 0$; then at the point $(-1, 1)$, $\dfrac{dy}{dx} =$

A. 2

B. -1

C. $-\dfrac{1}{4}$

D. $\dfrac{1}{4}$

E. 1

4. A certain population grows exponentially and doubles in 3 days. If the initial population is 100, how long does it take for the population to reach 1200?

A. $\dfrac{1}{3}\,\dfrac{\ln 2}{\ln 12}$

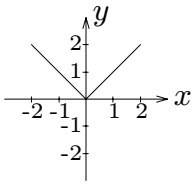
B. $\dfrac{1}{3}\,\dfrac{\ln 12}{\ln 2}$

C. 10.5

D. $3\dfrac{\ln 12}{\ln 2}$

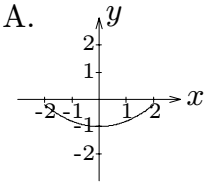
E. $3\dfrac{\ln 2}{\ln 12}$

5. The following is a graph of $f'(x)$ for $-2 \leq x \leq 2$.

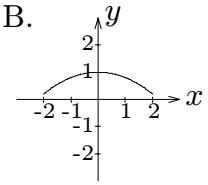


Which of the following could be a graph of f?

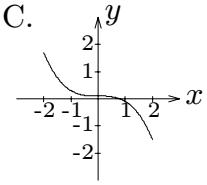
A.



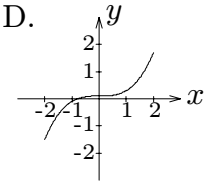
B.



C.



D.



E. There is not enough information to determine a possible graph of f.

6. Let $f(x) = x^3 + x^2 - x + 2$. Find all x for which f is decreasing.

A. $x > -1$

B. $x < \dfrac{1}{3}$

C. $x < -1$ or $x > \frac{1}{3}$

D. $-1 < x < \dfrac{1}{3}$

E. $x > \dfrac{1}{3}$

7. By using a linear approximation, near $x = 27$, the value of $(26)^{2/3}$ is approximately given by

A. $9 + \frac{1}{3}$

B. $9 - \frac{1}{3}$

C. $9 - \frac{1}{9}$

D. $9 + \frac{2}{9}$

E. $9 - \frac{2}{9}$

8. A spherical balloon is losing air at the rate of 4 cubic inches per minute. What is the rate of change of the radius of balloon when the radius is 10 inches?

A. $-\frac{1}{100\pi}$ in/min

B. $\frac{1}{100\pi}$ in/min

C. $-\frac{3}{100\pi}$ in/min

D. $\frac{3}{100\pi}$ in/min

E. $-\frac{\pi}{100}$ in/min

9. Let $f(x) = (e^x + x^3)\cos^2 x$. Find $f'(x)$.

$f'(x) =$

10. Find all relative extrema of $f(x) = x^3 - 24\ln x$. Justify your answer with the first or second derivative test.

rel. max. occur at $x =$

rel. min. occur at $x =$

11. A land owner wishes to use 1000 ft of fencing to enclose a rectangular region. Suppose one side of the property lies along a stream and thus needs no fencing. What should the lengths of the sides be in order to maximize the area? Draw a sketch for this problem. Be sure to show that this is a maximum.

length:

width:

12. Find $f(x)$ if $f'(x) = x^2 + x - 2$ and $f(1) = 1$.

$f(x) =$