

MATH 75A

Test 3

December 5, 2005

Name: _____

- No books, notes, or calculators are allowed.
- Please show all your work for problems 7-12.

Multiple choice questions: circle the correct answer

1. Let $f(x) = 5x^3 - 4x^2$. Find $f'(-1)$.

- A. -9 B. -7 C. 1 D. 7 E. 23

2. Let $f(x) = 2 \tan x$. Find $f'(0)$.

- A. 0 B. $\frac{1}{2}$ C. 2 D. 4 E. Does not exist

3. Simplify the expression: $\frac{(2x)^3 - 5x^3}{6x^2\sqrt{x}}$.

- A. $-\frac{\sqrt{x}}{2}$ B. $\frac{\sqrt{x}}{2}$ C. $\frac{1}{2\sqrt{x}}$ D. $\frac{2}{\sqrt{x}}$ E. $\frac{3x^{-1/2}}{6}$

4. The position of an object at time t is given by $s(t) = 6 \cos t + 2 \sin t$. Find the velocity of this object at $t = \frac{\pi}{6}$.

- A. $\sqrt{3} - 3$ B. $-3 - \sqrt{3}$ C. $1 - 3\sqrt{3}$ D. $3 + \sqrt{3}$ E. $3\sqrt{3} + 1$

5. If $f(3) = 2$, $f'(3) = 4$, $g(3) = 5$, and $g'(3) = 6$, find the derivative of $f(x)g(x)$ at $x = 3$.

- A. 2 B. 10 C. 24 D. 32 E. 34

6. If $f(x) = 3^{2-x}$, find $f'(x)$.

- A. 3^{2-x} B. -3^{2-x} C. $\ln(3)3^{2-x}$ D. $-\ln(3)3^{2-x}$ E. None of these

Regular problems: show all your work

7. Differentiate the following functions:

(a) $f(x) = 6x^4 - \frac{5}{\sqrt[3]{x}} + 2e^x$

(b) $g(x) = \pi^3 - 2 \sin(x^3)$

8. Find the points where the tangent line to the curve $y = \frac{x^2 - 3}{x - 2}$ is horizontal.

9. Find an equation of the tangent line to $y = \sqrt{x^2 - 9}$ at $(5, 4)$.

10. Evaluate the limits:

(a) $\lim_{x \rightarrow 0} \frac{\sin(2x)}{3x}$

(b) $\lim_{x \rightarrow 0} \cot(2x) \sin(3x)$

11. The size of a bacteria population at time t is $P = 100(e^t - t)$, where time is measured in days. Find the rate of growth of the population at $t = 4$.

12. Find an equation of the tangent line to the curve $x^4 - y^4 - 2x^3y = -11$ at $(-1, 2)$.

Please do not write anything on this page

Problem	Value	Score
1	3	
2	3	
3	3	
4	3	
5	3	
6	3	
7	6	
8	5	
9	5	
10	6	
11	5	
12	5	
Total	50	

	Your scores (so far)	Out of
Homework		180
Mathematica lab 1		10
Quizzes (2 lowest scores dropped)		50
Test 1		50
Test 2		50
Test 3		50
Total		390

The above does not include: Mathematica lab 2 (10 points), Final Exam (100 points);
Optional set Review (for extra credit – 30 points).