MATH 75

Test 2

March 29, 2004

Name:_____

- No books, notes, or calculators are allowed.

- Please show all your work.

- Please simplify your answers.

Multiple choice questions: circle the correct answer

1. Find the derivative of the function $f(x) = \sin^3(x)$.

   A. $\cos^3(x)$ **B.** $3\sin^2(x)$ **C.** $3\cos^2(x)$ **D.** $3\sin^2(x)\cos(x)$ **E.** $-3\sin^2(x)\cos(x)$

2. Find the vertical and horizontal asymptotes for the function $f(x) = \dfrac{x^3 + 2x + 1}{x^3 - x}$.

   A. $x = 0$, $x = 1$ **B.** $x = 0$, $x = 1$, $y = 1$ **C.** $x = 1$, $y = 1$
   D. $x = -1$, $x = 0$, $x = 1$, $y = 1$ **E.** $x = -1$, $x = 0$, $x = 1$, $y = 0$

3. Evaluate the limit: $\displaystyle\lim_{x \to \infty} \dfrac{5x + 4}{x^2 + 2x - 1}$.

   A. $-\infty$ **B.** 0 **C.** 1 **D.** 5 **E.** ∞

4. If $f(x) = \sqrt{x}$, find $f''(4)$.
   A. $-\dfrac{1}{2}$ **B.** $-\dfrac{1}{32}$ **C.** 0 **D.** $\dfrac{1}{8}$ **E.** 2

5. The graph of $y = x^4 + 2x^2 + 5$ has how many inflection points?
   A. 0 **B.** 1 **C.** 2 **D.** 3 **E.** 4

6. Find the critical numbers of $y = 4x^3 - x^4$.
   A. 0 **B.** 2 **C.** 0 and 3 **D.** 0 and 4 **E.** no critical numbers

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Regular problems: show all your work

7. Evaluate the limit: $\displaystyle\lim_{x \to -\infty} \frac{5x^2 + 4}{\sqrt{3x^2 + 2}}$

8. Find the linear approximation of the function $f(x) = \cos(x)$ at $a = \dfrac{\pi}{2}$.

9. Find the intervals of concavity of the function $f(x) = 4x^3 - 3x^2 - 1$.

10. Find local maxima and minima of $f(x) = (x^2 - 1)^2$.

11. At noon, ship A is 150 km west of ship B. Ship A is sailing east at 35 km/h and ship B is sailing north at 25 km/h. How fast is the distance between the ships changing at 4:00 PM?

12. Find an equation of the tangent line to the curve $xy + 3x^2y^2 - 5x = 7$ at the point $(-1, 1)$.

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

	Your scores so far	Out of
Homework		114
Quizzes		35
Mathematica		20
Test 1		50
Test 2		50
Total		269
Grade		

This page may be used as scratch paper