MATH 75

Test 2

October 31, 2003

Name:_____

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	

Multiple choice questions: circle the correct answer

1. Find the derivative of the function $f(x) = \sqrt{x^2 - 1}$.

   A. $\dfrac{1}{2x\sqrt{x^2-1}}$ **B.** $\dfrac{1}{2\sqrt{x^2-1}}$ **C.** $\dfrac{1}{\sqrt{x^2-1}}$ **D.** $\dfrac{x}{\sqrt{x^2-1}}$ **E.** $2x\sqrt{x^2-1}$

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

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

   E. $x = 1,\ x = -1,\ y = 0$

3. Evaluate the limit: $\lim\limits_{x\to\infty} \dfrac{9 - x^2}{5 + x}$.

   A. $-\infty$ **B.** -5 **C.** 0 **D.** 3 **E.** ∞

4. If $f(x) = \sin^2(x)$, find $f'\left(\dfrac{\pi}{4}\right)$.

   A. -2 **B.** -1 **C.** 0 **D.** $\dfrac{1}{2}$ **E.** 1

5. The graph of $y = 2x^3 - x^4$ has how many local maximums?

   A. 0 **B.** 1 **C.** 2 **D.** 3 **E.** 4

6. Find the inflection point(s) of the graph of $y = 2x^3 - x^4$.

   A. $(0,0)$ only **B.** $(1,1)$ only **C.** $\left(\dfrac{3}{2}, \dfrac{27}{16}\right)$ only **D.** $(0,0)$ and $(1,1)$

   E. $(0,0)$ and $\left(\dfrac{3}{2}, \dfrac{27}{16}\right)$

Regular problems: show all your work

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

8. Find the linear approximation of the function $f(x) = \dfrac{1}{x^2}$ at $a = -1$.

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

10. The volume of a sphere of radius r is $V = \frac{4}{3}\pi r^3$. Air is pumped into a spherical balloon at the rate of 100 cm^3 per second. How fast is the radius of the balloon increasing when the radius is 10 cm?

11. Find the absolute maximum and minimum values of $f(x) = (x^2 - 1)^3$ on the interval $[-1, 2]$.

12. Find an equation of the tangent line to the curve $xy^2 + 3xy = 4$ at the point $(1, 1)$.