MATH 75

Test 1

February 23, 2005

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 domain of the function $f(x) = \dfrac{1}{\sqrt{x-5}}$.

   A. $x > 0$ **B.** $x \geq 0$ **C.** $x \neq 0$ **D.** $x > 5$ **E.** $x \neq 5$

2. If $f(x) = x^2$ and $g(x) = \cos x$, find $(f \circ g)(x)$.

   A. $x^2 \cos x$ **B.** $2x \cos x$ **C.** $\cos^2 x$ **D.** $\cos x^2$

   E. None of the above

3. Find the derivative of $x^2(x^3 + x)$.

   A. $2x(3x^2 + 1)$ **B.** $x^5 + x^3$ **C.** $5x^4 + 3x^2$
   D. $\dfrac{(x+h)^2((x+h)^3 + (x+h)) - x^2(x^3 + x)}{h}$ **E.** Does not exist

4. Evaluate the limit: $\displaystyle\lim_{x \to 4} \dfrac{x+4}{x-4}$

   A. 0   **B.** ∞ **C.** $-\infty$ **D.** 8   **E.** Does not exist

5. If $f(1) = 4$, $f'(1) = 3$, $g(1) = 2$, and $g'(1) = -1$, find the derivative of the quotient $\dfrac{f(x)}{g(x)}$ at $x = 1$.
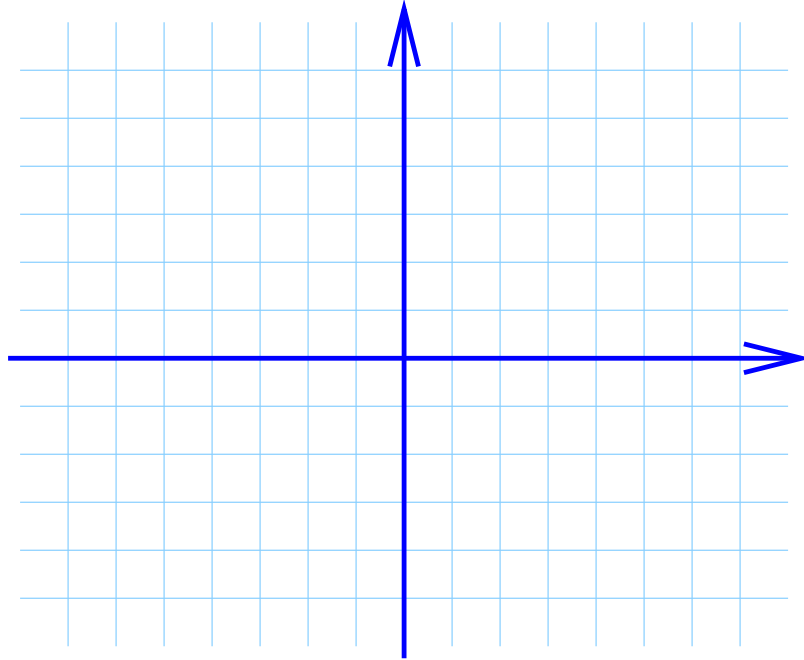
   A. -3 **B.** -2.5 **C.** 0.5 **D.** 2.5 **E.** 5

6. If the curve $y = \sin x$ is stretched vertically by a factor of 2 then the equation of the new curve is

   A. $y = \sin x + 2$ **B.** $y = \sin(x+2)$ **C.** $y = 2\sin x$ **D.** $y = \sin(2x)$ **E.** $2y = \sin x$

2

Regular problems: show all your work

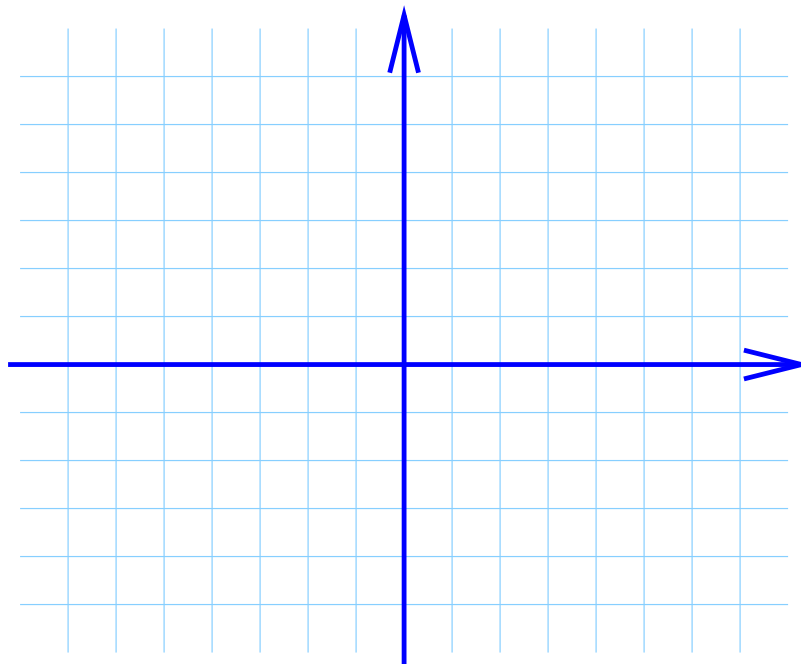7. Sketch the graph of $f(x) = 6 - \dfrac{1}{2}x^2$.

8. Find an equation of the tangent line to $y = 6 - \dfrac{1}{2}x^2$ at $(2, 4)$. Draw this tangent line on the above graph.

9. Show that the equation $x^5 + x - 5 = 0$ has a real root.

10. Evaluate the limit: $\lim\limits_{x \to 4} \dfrac{\sqrt{x} - 2}{x - 4}$. If the limit is infinite, determine whether it is $+\infty$ or $-\infty$.

11. Let $f(x) = \begin{cases} -x-1 & , \text{ if } \quad x < 0 \\ 3 & , \text{ if } \quad x = 0 \\ 3x-1 & , \text{ if } \quad 0 < x < 1 \\ -2x+5 & , \text{ if } \quad x \geq 1 \end{cases}$.

Sketch the graph of $f(x)$.

Is $f(x)$ coninuous at 0?

Is $f(x)$ continuous at 1?

12. Find the derivative of the function $f(x) = x\sqrt{x}\left(5x - \dfrac{3}{x^4}\right)$.

Simplify your answer.

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

	Your scores so far	Out of
Homework		64
Quizzes		20
Mathematica		10
Test 1		50
Total		144
Grade		

This page may be used as scratch paper