# MATH 75A

## Test 2

April 13, 2009

**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. How many vertical asymptotes does the curve $y = \dfrac{x}{x^2 + 3x}$ have?

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

2. Evaluate $\lim\limits_{x \to \infty} \dfrac{4x^2 + 3x - 4}{5x^3 - 3x + 4}$.

   **A.** $-1$ **B.** 0 **C.** $\frac{4}{5}$ **D.** 1 **E.** Does not exist

3. Evaluate $\lim\limits_{x \to -\infty} \dfrac{x^3 + 8x^2 - 2}{7x^3 - 2x - 4}$.

   **A.** 0 **B.** $\frac{1}{7}$ **C.** $\frac{1}{2}$ **D.** 1 **E.** Does not exist

4. If $f(x) = \frac{5}{2}$, find $f'(2)$.

   **A.** 0 **B.** 2 **C.** 5 **D.** $\frac{5}{2}$ **E.** Does not exist

5. If $f(x) = 8 - x$, find $f'(4)$.

   **A.** 0 **B.** 1 **C.** 4 **D.** 8 **E.** $-1$

6. If $f(1) = 1$, $f'(1) = -1$, $g(1) = 2$, and $g'(1) = -3$, find the derivative of $f(x)g(x)$ at $x = 1$.

   **A.** $-5$ **B.** $-3$ **C.** 0 **D.** 1 **E.** 3

**Regular problems: show all your work**

7. Evaluate the limit: $\lim_{x \to 3^-} \dfrac{x+3}{x-3}$.

8. Find the vertical and horizontal asymptotes of $f(x) = \dfrac{x-1}{x+1}$.

9. Find an equation of the tangent line to $y = \sqrt{x^3 + 1}$ at $(2, 3)$.

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

11. Let $f(x) = \dfrac{x\sqrt{x} + 2x^{3/2}}{x^2\sqrt[3]{x}}$. Simplify $f(x)$ and then find $f'(x)$.

12. Let $f(x) = \sec(x^2)$. Find $f'(x)$.