

**Math 165 Spring 2008**  
**Problem Set 1**

Quiz 1 on Friday, January 25 covers sections 1.1, 1.3, 1.4 and 1.5 as well as the problems below. Read those sections and try to solve as many problems as you can. The more you solve, the more likely you will get a good grade in Quiz 1, as the problems in Quiz 1 will be from this set. The problems here are not to be handed in.

**From Textbook**

**Section 1.1 (pages 59-61):** 3, 7, 8, 10, 14, 16, 17, 29, 33, 43

**Section 1.3 (pages 72-73):** 3, 6, 7, 13, 15, 24, 26, 31, 43, 45

**Section 1.4 (page 77):** 3, 4, 5, 6, 7, 10, 11

**Section 1.5 (pages 81-82):** 2, 9, 10, 13, 21, 27, 29, 31, 32, 39, 42

**Other Problems**

In problems 1-8, find the indicated limit or state that it does not exist.

1.  $\lim_{x \rightarrow 9} \frac{x - 9}{\sqrt{x} - 3}$

2.  $\lim_{t \rightarrow 6} \frac{t - 6}{\sqrt{t} - \sqrt{6}}$

3.  $\lim_{x \rightarrow 1} \frac{x^2 - 1}{x^2 + x - 2}$

4.  $\lim_{x \rightarrow 1} \frac{x^2 + 4x - 5}{x^2 - 1}$

5.  $\lim_{x \rightarrow -1} \frac{x^2 - 1}{|x + 1|}$

6.  $\lim_{x \rightarrow 0} \frac{\sqrt{x + 3} - \sqrt{3}}{x}$

7.  $\lim_{x \rightarrow 0} \frac{x}{\sin 10x}$

8.  $\lim_{x \rightarrow 0} \frac{\sec x}{x \csc x}$

9. Evaluate the following limits.

a-)  $\lim_{x \rightarrow \infty} \frac{-2x + 3}{2 + 3x}$

b-)  $\lim_{x \rightarrow \infty} \frac{2x + 5x^2}{2x^2 + 5}$

10. An alternative method for calculating the limit of a quotient of two polynomials as  $x \rightarrow \infty$  is to make the substitution  $x = \frac{1}{h}$  and calculate the limit as  $h \rightarrow 0^+$ . Similarly, to calculate the limit of a quotient of two polynomials as  $x \rightarrow -\infty$ , we may substitute  $x = \frac{1}{h}$  and calculate the limit as  $h \rightarrow 0^-$ . Use this method to calculate the following limits.

a-)  $\lim_{x \rightarrow \infty} \frac{5x + 3}{2x^2 - 1}$

b-)  $\lim_{x \rightarrow -\infty} \frac{2x^2 - 3}{7x + 4}$

11. Evaluate the following limits.

**a-)**  $\lim_{x \rightarrow 0^+} \frac{\lceil x \rceil}{x}$

**b-)**  $\lim_{x \rightarrow 0^-} \frac{\lceil x \rceil}{x}$

**c-)**  $\lim_{x \rightarrow 0} \frac{\lceil x \rceil}{x}$

12. Find all horizontal and vertical asymptotes to the graph of

$$f(x) = \frac{x + 2}{x^2 - 4x + 3}$$

Determine  $\lim_{x \rightarrow A^+} f(x)$  and  $\lim_{x \rightarrow A^-} f(x)$  at each vertical asymptote A.