MATH 110 Problem Set 1.5a (ordinary two-sided limits)

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The following problems based on Section 1.5 of the textbook will help you study. *You do not need to hand in solutions to these problems.*

1. (Based on 1.5.1) Explain in your own words what is meant by the equation

$$\lim_{x \to 3} f(x) = 7$$

   Is it possible for the above statement to be true yet $f(3) = 4$? Explain.

2. (Based on 1.5.22,26) Use a table of values and/or a graphing device to estimate the following limits:

   (a) $\displaystyle \lim_{x \to 0} \frac{\sqrt{x+9} - 3}{x}$

   (b) $\displaystyle \lim_{x \to 0} \frac{10^x - 2^x}{x}$

3. Estimate the value of the limit

$$\lim_{x \to 0} (1 + x)^{1/x}$$

   to four decimal places. Do you recognize the number? Confirm your guess by using a graphing device.

4. (Based on 1.5.23) Use a table of values and/or a graphing device to estimate the limit $\displaystyle \lim_{x \to 0} \frac{\tan 3x}{\sin x}$.

5. (Based on 1.5.44) Use a table of values to guess the value of the limit $\displaystyle \lim_{x \to 0} \frac{\tan x - x}{x^3}$. Use a graphing device to confirm or disconfirm your guess.

You may find the following additional exercises from Section 1.5 helpful.

1.5 C-level: 1, 19–22, 23, 26, 35;
    B-level: 32–44;
    A-level: 49