

Calculating Limits- HW Problems

1. Evaluate the following limits.

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

$$b. \lim_{x \rightarrow 2} \frac{x^2 - 5x + 6}{x - 2}$$

$$c. \lim_{x \rightarrow 3} \frac{x^2 + 4x + 3}{x^2 + x - 6}$$

$$d. \lim_{x \rightarrow 3} \sqrt{x + 1}$$

$$e. \lim_{h \rightarrow 0} \frac{(4+h)^2 - 16}{h}$$

$$f. \lim_{h \rightarrow 0} \frac{\sqrt{4+h} - 2}{h}$$

$$g. \lim_{x \rightarrow 1} \frac{(\sqrt{x} - 1)}{x - 1}$$

$$h. \lim_{x \rightarrow 3} \frac{(\sqrt{x^2 + 16} - 5)}{x - 3}$$

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

2. Use the squeeze theorem to show:

$$a. \lim_{x \rightarrow 0} x^2 \cos(2x) = 0$$

$$b. \lim_{x \rightarrow 0} x \sin\left(\frac{3}{x}\right) = 0$$

3. Suppose $f(x) = \sqrt{x + 3}$ if $x \geq 1$
 $= \sqrt{3 - x}$ if $x < 1$.

Find the following:

a. $\lim_{x \rightarrow 1^+} f(x)$

b. $\lim_{x \rightarrow 1^-} f(x)$

c. $\lim_{x \rightarrow 1} f(x)$.