Section 1.5 Extra Practice

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1. Evaluate each limit.

a. $\lim\limits_{x \to 5} (x^2 - 3x + 1)$

b. $\lim\limits_{x \to -1} \left(\dfrac{\sqrt{2x}}{4x^4} \right)$

c. $\lim\limits_{x \to 4} (x^{\frac{x}{2}} + \sqrt{x})$

d. $\lim\limits_{x \to -2} \left(\sqrt{\dfrac{(x + 3)}{(x^2 + 1)}} \right)$

2. Use a graphing calculator to graph the function and to estimate the limit. Then, find the limit by substitution.

a. $\lim\limits_{x \to 2} \left(\dfrac{\sqrt{x}}{x^3} \right)$

b. $\lim\limits_{x \to 0} \left(\dfrac{x + x^2 + x^3}{x^2 + x + 1} \right)$

3. Evaluate the limit of each indeterminate quotient.

a. $\lim\limits_{x \to -1} \left(\dfrac{x^2 - 1}{x + 1} \right)$

b. $\lim\limits_{x \to \frac{1}{2}} \left(\dfrac{12x^2 - 2x - 2}{4x - 2} \right)$

c. $\lim\limits_{x \to 4} \left(\dfrac{2(x - 4)}{6(x^3 - 64)} \right)$

d. $\lim\limits_{x \to 0} \left(\dfrac{3 - \sqrt{9 + x}}{x} \right)$

e. $\lim\limits_{x \to 1} \left(\dfrac{x^5 + 2x - \sqrt{x}}{\sqrt{x + 4x^2}} \right)$

4. What is the easiest method for showing that $\lim\limits_{x \to 3} \left(\dfrac{x^2 + x - 6}{(x - 2)^2} \right) = 6$?

5. Evaluate the limit by change of variable.

a. $\lim\limits_{x \to 0} \left(\dfrac{\sqrt[3]{x + 1} - 1}{x} \right)$

b. $\lim\limits_{x \to 1} \left(\dfrac{x - 1}{x^{\frac{1}{4}} - 8} \right)$

6. By using one-sided limits, determine whether the limit exists. It may help to draw a graph.

a. $\lim\limits_{x \to -2} \left(\dfrac{|x + 2|}{x + 2} \right)$

b. $\lim\limits_{x \to -4} \left(\dfrac{|x + 4|(2x - 1)}{x + 4} \right)$

c. $\lim\limits_{x \to 0} \left(\dfrac{|x^2|}{x} \right)$

7. If $\lim\limits_{x \to -2} f(x) = 2$, determine $\lim\limits_{x \to -2} \dfrac{2f(x) + x}{x^2 + 1}$.

8. Evaluate the limit, if it exists, using any appropriate technique.

a. $\lim\limits_{h \to 1} \left(\dfrac{h - 1}{\sqrt{h} - 1} \right)$

b. $\lim\limits_{h \to 3} \left(\dfrac{(x^2 - 2x - 3)(x - 3)^{-1}}{x + 1} \right)$

c. $\lim\limits_{h \to 0} \left(\dfrac{(3 + h)^2 - (3)^2}{h} \right)$

d. $\lim\limits_{h \to -1} \left(\dfrac{x^2 - 2x - 3}{x + 1} - \dfrac{1}{x - 4} \right)$

9. What is the easiest method for showing that $\lim\limits_{x \to 2} \left(\sqrt{\dfrac{x^3 - 3x + 1}{\sqrt{x}}} \right) = \sqrt{\dfrac{3}{\sqrt{2}}}$?