Section 1.3

Finding Limits Analytically

1. Limits of continuous functions can be evaluated with direct substitution.

   a. $\lim_{x \to -5}[3x^2 + 4x - 5]$ **b.** $\lim_{p \to -2} \frac{2p+4}{3p}$ **c.** $\lim_{x \to 0}[3e^x - \sin x + \ln(x+1)]$

2. Use factoring and/or expanding, then use cancellation

   a. $\lim_{x \to -2} \frac{2x+4}{x^2 - 3x - 10}$

   b. $\lim_{x \to -3} \frac{x^3 + 27}{x+3}$ (Hint: Factor sum of cubes)

   c. $\lim_{t \to 1} \frac{2t^2 + 3t - 5}{1 - t}$

   d. $\lim_{h \to 0} \frac{(-1+h)^2 - 1}{h}$

   e. $\lim_{h \to 0} \frac{(3+h)^3 - 27}{h}$

3. Use our "rationalizing the denominator/numerator" technique

   a. $\lim_{x \to -10} \frac{\sqrt{x+19} - 3}{x+10}$

   b. $\lim_{h \to 0} \frac{\sqrt{4+h} - 2}{h}$

   c. $\lim_{x \to 1} \frac{1 - \sqrt{x}}{x - 1}$

4. Solve by simplifying the compound fraction

   a. $\lim_{h \to 0} \frac{\frac{1}{1+h} - 1}{h}$

   b. $\lim_{x \to -4} \frac{\frac{8}{x+6} - 4}{x+4}$

   c. $\lim_{x \to 2} \frac{2 - x}{\frac{2}{x} - 1}$