

1. Indeterminate Forms. Use l'Hopital's rule to find the following limits.

(a) $\lim_{x \rightarrow 0} \left(\frac{1}{x} - \frac{1}{\sin x} \right)$

(b) $\lim_{x \rightarrow \infty} x^{1/x}$

(c) $\lim_{x \rightarrow \infty} \left(1 + \frac{a}{x} \right)^{bx}$ where $a, b \neq 0$.

(d) $\lim_{x \rightarrow -\infty} x \ln \left(1 - \frac{1}{x} \right)$

2. We want to construct an open-top box using 100 square inches of cardboard. Find the largest possible volume, and its dimensions.

3. Find the point on the curve $y = \frac{1}{x}$ which is closest to the point $(\frac{1}{2}, 1)$.

4. Approximate the solution to $y = x^2 - 2x - 1$ by using Newton's method, correct to 4 decimal places. Start with $x_1 = 0$. How many iterations do you need, to have it correct to 7 decimal places?