1. **Error in Driving Speed Estimate.** Consider the speed function $s(x)$ and its linear approximation $L(x)$ found in Example 4.6.2 in your notes. The error in using $L(x)$ to approximate $s(x)$ is the function $E(x) = |L(x) - s(x)|$. For what values of x is $E(x) < 1$? *Use a calculator.*

2. **A Better Approximation.** For a differentiable function $f(x)$, the linear approximation $L(x)$ at the point a has the property that $f(a) = L(a)$ and $f'(a) = L'(a)$. Develop a method of approximation using a quadratic polynomial $Q(x) = b_2(x-a)^2 + b_1(x-a) + b_0$ so that $f(a) = Q(a)$, $f'(a) = Q'(a)$, and $f''(a) = Q''(a)$. Use this method to approximate $\cos x$ at $a = 0$.

3. **L'Hôpital Loops.** Show that $\lim_{x\to\infty} \dfrac{\sqrt{2x+1}}{\sqrt{3x+4}}$, while indeterminate, cannot be evaluated using L'Hôptal's Rule. Instead, evaluate the limit using techniques from Chapter 2.

4. **A Geometric Limit.** For $f(\theta)$ and $g(\theta)$ the area functions shown below, compute $\lim_{\theta \to 0} \dfrac{g(\theta)}{f(\theta)}$. *Hint: Keep using L'Hôpital's Rule, you'll get there eventually.*

