1. Let $u = \langle 2, -3 \rangle$ and $v = \langle 5, -1 \rangle$. Find $\|u\|$, $\|v\|$, $u \cdot v$, and the vector projection of $u$ onto $v$.

2. Find all values of $x$ such that $\langle 1, x \rangle \perp \langle 1 - 2x, x \rangle$.

3. Find the indicated limits, or show they do not exist. Justify your answer.
   (a) $\lim_{x \to 3} (3x + 1)(2x - 5)^{2008}$
   (b) $\lim_{t \to 2} \frac{t^2 - 4}{(t+1)(t+2)}$
   (c) $\lim_{x \to \infty} \frac{3x^2 - 12}{2x^2 + x + 1}$
   (d) $\lim_{t \to 0} \frac{|t|}{t}$
   (e) $\lim_{\theta \to 0} \frac{\tan 3\theta}{\theta}$

4. Derive the formula $\frac{d}{dx} \cos(x) = -\sin(x)$

5. Find all points where $f(x) = \frac{2x^3}{(x-5)(x^2-9)}$ is continuous, and find all asymptotes.

6. Find the derivatives.
   (a) $f'(x)$, where $f(x) = 3x + \frac{x^2 + 7}{x-6}$
   (b) $f'(x)$, where $f(x) = \tan \sqrt{2x - 1}$
   (c) $\frac{d}{dx}(\frac{x^2 - 1}{x^2 + 17 \sin(x)})$

7. Prove one of the following statements:
   (a) If $u$ and $v$ are vectors in $\mathbb{R}^n$, then $|u \cdot v| \leq \|u\| \cdot \|v\|$
   (b) The sum of two functions continuous at a point $x$ is continuous at $x$.
   (c) State and prove the product rule for differentiation.