1. (page 125 in the text) Find the numbers $a, b$ such that

$$\lim_{x \to 0} \frac{\sqrt{ax + b} - 2}{x} = 1.$$ 

2. (page 125 in the text) Evaluate the limit

$$\lim_{x \to 0} \frac{|2x - 1| - |2x + 1|}{x} = 1.$$ 

3. Compute the limits:
   (a) $\lim_{x \to 0} \frac{\sin(3x)}{x}$,
   (b) $\lim_{x \to 0} \frac{\sin(x^2)}{x^2}$,
   (c) $\lim_{x \to 0} \frac{\sin(\sin(x))}{x}$.

4. Does the following limit exist? If yes, compute it and if no, explain why.
   (a) $\lim_{x \to 0} x^5 \sin(\tan(x))$,
   (b) $\lim_{x \to 0} x \sin(\tan(x^5))$.

5. Suppose you know that $\lim_{x \to 2} f(x) = 3$ and $\lim_{x \to 2} g(x) = 4$. Compute the limit

$$\lim_{x \to 2} \frac{f(x) + g(x)^2}{g(x) - f(x) + x}.$$ 

6. Compute the limits:
   (a) $\lim_{x \to \infty} \frac{\sin(3x)}{x}$,
   (b) $\lim_{x \to \infty} \frac{5x^2 + x + 1}{x^2 - 1}$.

7. Is there a number $a$ such that

$$\lim_{x \to \infty} \frac{ax^3 + 3x - 5}{x^4 - x^2 - 6} = 11 ?$$

Explain your answer.