1. Show that the function is continuous on $(-\infty, +\infty)$:

$$f(x) = \begin{cases} x^2, \text{ if } x < 1 \\ \sqrt{x}, \text{ if } x \geq 1 \end{cases}$$

2. Find the values a, b that makes f continuous everywhere:

$$f(x) = \begin{cases} \frac{x^2-4}{x-2}, \text{ if } x < 2 \\ ax^2 - bx + 3, \text{ if } 2 \leq x < 3 \\ 2x - a + b, \text{ if } x \geq 3 \end{cases}$$

3. Show that the equation $x = \cos x$ has a solution on $(0, \frac{\pi}{2})$

4. Compute the limits:

(i).
$$\lim_{x \to 2^-} \frac{x^2 - 2x}{x^2 - 4x + 4}$$

(ii).
$$\lim_{x \to -\infty} \frac{1 + x^6}{x^4 + 1}$$

(iii).
$$\lim_{x \to \infty} (x - \sqrt{x})$$

(iv).
$$\lim_{x \to 1} \frac{2 - x}{(x-1)^2}$$

(v).
$$\lim_{x \to \infty} (\sqrt{9x^2 + x} - 3x)$$

(vi).
$$\lim_{x \to \infty} \frac{\sin^2 x}{x^2}$$