Show your work. You will be graded on the correctness of your reasoning as well as your answers. Indicate answers clearly.

**There are 4 problems in the quiz.**

(7 points) **1.** Let \( f(x) = x - 1 \) for \(-2 < x \leq 2\), and \( f(x + 4) = f(x) \) for any \( x \).
   a) Sketch the graph of the function \( f(x) \).
   b) Find the Fourier series of the function \( f(x) \).
   c) Is the Fourier series convergent at \( x = 0 \)? At \( x = 1 \)? At \( x = 2 \)? At \( x = -1 \)? At \( x = -2 \)? At \( x = 37 \)? At \( x = -111 \)? If yes, what are the corresponding values of the sum of the Fourier series?
   d) Sketch the graph of the sum of the Fourier series.

(5 points) **2.** Let \( f(x) = x - 1 \) for \( 0 < x < 2 \).
   a) Find the Fourier cosine series of the function \( f(x) \).
   b) Is the Fourier cosine series convergent at \( x = 0 \)? At \( x = 1 \)? At \( x = 2 \)? At \( x = 3 \)? If yes, what are the corresponding values of the sum of the Fourier cosine series?
   c) Sketch the graph of the sum of the Fourier cosine series.

(5 points) **3.** Let \( f(x) = x - 1 \) for \( 0 < x < 2 \).
   a) Find the Fourier sine series of the function \( f(x) \).
   b) Is the Fourier sine series convergent at \( x = 0 \)? At \( x = 1 \)? At \( x = 2 \)? At \( x = 3 \)? If yes, what are the corresponding values of the sum of the Fourier sine series?
   c) Sketch the graph of the sum of the Fourier sine series.

(5 points) **4.** Let \( f(x) = x - 1 \) for \( 0 < x < 2 \).
   a) Find the Fourier series of the function \( f(x) \) corresponding to the boundary conditions \( f'(0) = 0 \), \( f(2) = 0 \): \( f(x) \sim \sum_{m=1}^{\infty} \alpha_m \cos(\pi(2m-1)x/4) \)
   b) Is the obtained Fourier series convergent at \( x = 0 \)? At \( x = 1 \)? At \( x = 2 \)? At \( x = 3 \)? If yes, what are the corresponding values of the sum of the Fourier series?
   c) Sketch the graph of the sum of the obtained Fourier series.