Worksheet 08/25
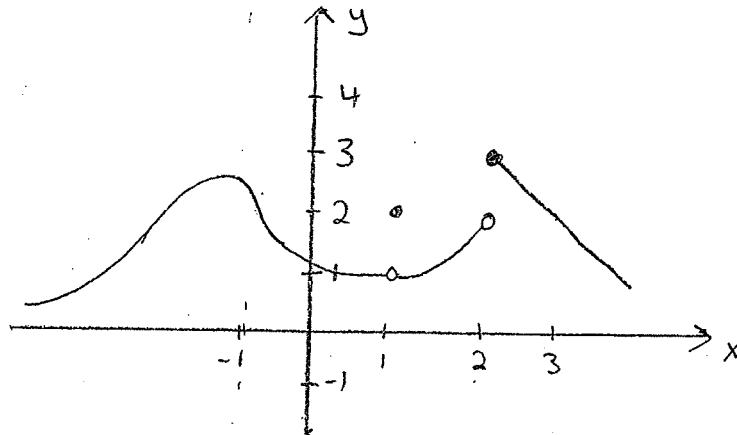
1) Compute the limits, if the graph of $y = g(x)$ is given as follows,

a) $\lim_{x \to -1} g(x)$

b) $\lim_{x \to 1} g(x)$

c) $\lim_{x \to 2} g(x))$

2) Define

$$f(x) = \begin{cases} x^2 - 1 & \text{if } x \le 2 \\ x + 1 & \text{if } x > 2 \end{cases}$$

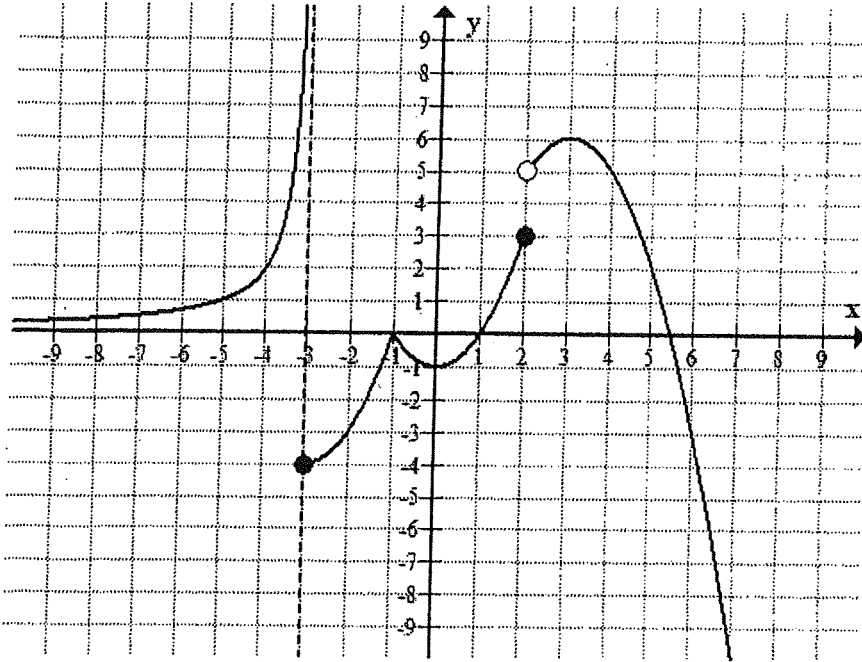Compute the following limits or explain why they don't exist:

a) $\lim_{x \to 2^-} f(x)$

b) $\lim_{x \to 2^+} f(x)$

c) $\lim_{x \to 2} f(x)$

(d) Sketch the graph of $y = f(x)$.

Problem 3 The graph of a function f is given below. Use the graph to find the limits below. Specify if a limit does not exist or is infinite.

$$\lim_{x \to -3^-} f(x) =$$

$$\lim_{x \to -3^+} f(x) =$$

$$\lim_{x \to -3} f(x) =$$

$$\lim_{x \to 3} f(x) =$$

$$\lim_{x \to 2^-} f(x) =$$

$$\lim_{x \to 2^+} f(x) =$$

$$\lim_{x \to 2} f(x) =$$

$$\lim_{x \to -1} f(x) =$$

$$\lim_{x \to -\infty} f(x) =$$

$$\lim_{x \to +\infty} f(x) =$$

Problem 4 Sketch the graph of a function $y = f(x)$ which satisfies all of the following conditions:

(i) the domain of f is $(0, +\infty)$;

(ii) $f(2) = f(4) = 0$;

(iii) $\lim_{x \to 0^+} f(x) = -\infty$;

(iv) $\lim_{x \to 2} f(x) = +\infty$;

(v) $\lim_{x \to 4^-} f(x) = 0$ and $\lim_{x \to 4^+} f(x) = 1$;

(vi) $\lim_{x \to +\infty} f(x) = 3$.