Answer on Question #80054 – Math – Calculus

Question

$$g(x) = \frac{x-1}{x^2-5x+6}$$

1. Limit of g(x) as x approaches -2 from left
2. Limit of g(x) as x approaches 3 from right
3. Limit of g(x) as x approaches –infinity

Solution

$$g(x) = \frac{x-1}{x^2-5x+6}$$

1. Limit of g(x) as x approaches -2 from left

$$\lim_{x\to -2-0} g(x) = \lim_{x\to -2-0} \frac{x-1}{x^2-5x+6} = \frac{-3}{20} = -\frac{3}{20}$$

2. Limit of g(x) as x approaches 3 from right

$$\lim_{x\to 3+0} g(x) = \lim_{x\to 3+0} \frac{x-1}{x^2-5x+6} = \lim_{x\to 3+0} \left(\frac{x-1}{x-2} * \frac{1}{x-3}\right)$$
$$= \lim_{x\to 3+0} \left(\frac{x-1}{x-2}\right) * \lim_{x\to 3+0} \left(\frac{1}{x-3}\right) = 2 * (+\infty) = +\infty$$

Here, $x\to 3+0 \Rightarrow x>3 \Rightarrow x-3>0$

3. Limit of g(x) as x approaches –infinity

$$\lim_{x\to -\infty} g(x) = \lim_{x\to -\infty} \frac{x-1}{x^2-5x+6}$$
$$= \lim_{x\to -\infty} \frac{\frac{1}{x} - \frac{1}{x^2}}{1 - \frac{5}{x} + \frac{6}{x^2}} = \frac{\lim_{x\to -\infty} \left(\frac{1}{x} - \frac{1}{x^2}\right)}{\lim_{x\to -\infty} \left(1 - \frac{5}{x} + \frac{6}{x^2}\right)} = \frac{0}{1} = 0$$

Answer:

$$g(x) = \frac{x-1}{x^2-5x+6}$$

1. Limit of g(x) as x approaches -2 from left

$$\lim_{x \to -2-0} g(x) = -\frac{3}{20}$$

2. Limit of g(x) as x approaches 3 from right

$$\lim_{x \to 3+0} g(x) = +\infty$$

3. Limit of g(x) as x approaches –infinity

$$\lim_{x \to -\infty} g(x) = 0$$