

Continuity

1) $f(x) = x + 5, x = 1$

I. $f(1) = 6$

II. $\lim_{x \rightarrow 1} f(x) = 6$

III. $f(1) = \lim_{x \rightarrow 1} f(x)$

$f(x)$ is cont. @ $x = 1$

2) $f(x) = \frac{3x-1}{2x+6}, x = -3$

I. $f(-3) = \phi$

$f(x)$ is not cont. @ $x = -3$

3) $f(x) = \frac{x^2-16}{x-4}, x = 4$

I. $f(4) = \phi$

$f(x)$ is not cont @ $x = 4$

4) $f(x) = \frac{x^2-25}{x+5}, x = 5$

I. $f(5) = 0$

II. $\lim_{x \rightarrow 5} f(x) = 0$

III. $f(5) = \lim_{x \rightarrow 5} f(x)$

$f(x)$ is cont. @ $x = 5$.

5) $f(x)$ is cont. on $(-\infty, \infty)$

6) $f(x)$ is cont on $(-\infty, 0) \cup (0, \infty)$

7) $f(x)$ is cont. on $(-\infty, 1) \cup (1, \infty)$ 8) $f(x) = \frac{3x-5}{(2x-3)(x+1)}$

$f(x)$ is cont on $(-\infty, -1) \cup (\frac{3}{2}, \infty)$

9) $f(x) = \frac{x^2-4}{x-2}$

$\lim_{x \rightarrow 2} \frac{(x+2)(x-2)}{x-2} = 4$

$g(x) = \begin{cases} f(x), & x \neq 2 \\ 4, & x = 2 \end{cases}$

10) $f(x) = \frac{(x-3)(x-2)}{x-3}$

$\lim_{x \rightarrow 3} (x-2) = 1$

$g(x) = \begin{cases} f(x), & x \neq 3 \\ 1, & x = 3 \end{cases}$

12) a) $\lim_{x \rightarrow -1} f(x)$ DNE

$f(x)$ is not cont. @ $x = -1$

b) $f(1) = 1 \neq \lim_{x \rightarrow 1} f(x) = 2$

$f(x)$ is not cont. @ $x = 1$

c) $f(x)$ is cont. on $[-1, 0) \cup (0, 1) \cup (1, 2) \cup (2, 3)$

d) No, $f(x)$ has a non-removable discontinuity at $x = 0$.