

- Sec 9.2: Continuous functions, limits at infinity.

5] determine whether each function is continuous or discontinuous:

$$y = \frac{x^2 - x - 12}{x^2 + 3x} ; x = -3$$

cont. for all values of x except at the zeros of denominator

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 $x = -3$

$$\frac{(-3)^2 - 3 - 12}{(-3)^2 + 3(-3)} = \frac{0}{0} \text{ « } f(x) \text{ is discontinuous at } x = -3 \text{ »}$$

10] $y = 5x^2 - 2x$
polynomial.

so y is continuous for all values of x .

20] $f(x) = \begin{cases} x^2 + 4 & \text{if } x \neq 4 \\ 8 & \text{if } x = 4 \end{cases}$

if $\lim_{x \rightarrow 4} f(x) = f(4)$ then $f(x)$ is continuous at $x = 4$,
otherwise is discontinuous.

$$\lim_{x \rightarrow 4} f(x) = \lim_{x \rightarrow 4} (x^2 + 4) = 16 + 4 = \underline{20}$$

$$f(4) = 8$$

$$\lim_{x \rightarrow 4} f(x) \neq f(4)$$

∴ $f(x)$ is discontinuous at $x = 4$