

1) Determine if the function has a vertical asymptote or a removable discontinuity at  $x = -1$ .

$$1a) f(x) = \frac{x^2 - 1}{x + 1}$$

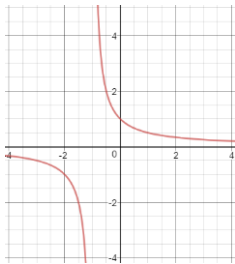
$$\lim_{x \rightarrow -1} \frac{x^2 - 1}{x + 1} = \lim_{x \rightarrow -1} (x - 1) = -2$$

Removable discontinuity at  $x = -1$

$$1b) f(x) = \frac{x^2 + 1}{x + 1}$$

$$1c) f(x) = \frac{\sin(x+1)}{x+1}$$

$$2a) \lim_{x \rightarrow -1^+} \frac{1}{x + 1}$$



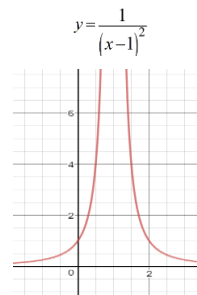
$$\lim_{x \rightarrow -1^+} \frac{1}{x + 1} = \infty$$

$$2b) \lim_{x \rightarrow 1^+} \frac{x^2}{(x - 1)^2}$$

$$= \lim_{x \rightarrow 1^+} x^2 \cdot \lim_{x \rightarrow 1^+} \frac{1}{(x - 1)^2}$$

$$= 1 \cdot \lim_{x \rightarrow 1^+} \frac{1}{(x - 1)^2}$$

$$1 \cdot \infty = \infty$$



$$2c) \lim_{x \rightarrow 2^+} \frac{x}{x - 2}$$

$$2d) \lim_{x \rightarrow 1^+} \frac{2+x}{1-x}$$

$$2e) \lim_{x \rightarrow -3^-} \frac{x + 3}{x^2 + x - 6}$$

$$2f) \lim_{x \rightarrow 0^-} \left(1 + \frac{1}{x}\right)$$

$$2g) \lim_{x \rightarrow 0^+} \frac{2}{\sin x}$$

NOTE: AP multiple choice questions from this section will be reflected in those found in the Unit 1 Lesson 5 Critical Homework!