Removable Discontinuity at $x=3$.
(Open point is $(3, 7)$)

Sec 2.5 #18

$$f(x) = \begin{cases} \frac{1}{x+2} & \text{if } x \neq -2 \\ 1 & \text{if } x = -2. \end{cases}$$

$a = -2$. $D_f : \mathbb{R}$.

At $x = -2$.

1. $f(-2) = 1$.
2. $\lim_{x \to -2} f(x) = \lim_{x \to -2} \frac{1}{x+2} = \frac{1}{0}$ = Infinite limit DNE

V.A asymptote at $x = -2$.

Infinite Discontinuity at $x = -2$.

Example: Find the numbers at which f is discontinuous.

$$f(x) = \begin{cases} 2^x & \text{if } x \leq 1 \\ 3-x & \text{if } 1 < x \leq 4 \\ \sqrt{x} & \text{if } x > 4 \end{cases} \qquad D_f : \mathbb{R}.$$

At $x = 1$

1. $f(1) = 2^1 = 2$
2. $\lim_{x \to 1} f(x)$ exists?

$\lim_{x \to 1^-} f(x) = \lim_{x \to 1^-} 2^x = 2^1 = 2$

$\lim_{x \to 1^+} f(x) = \lim_{x \to 1^+} 3-x = 3-1 = 2$ $\Rightarrow \lim_{x \to 1} f(x) = 2$.

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

f is continuous at $x = 1$

At $x = 4$

1. $f(4) = 3-4 = -1$.