Sec 1 Sep 22, 2020

#20 Sec 2.5

$$f(x)=\begin{cases}\dfrac{x^2-x}{x^2-1} & \text{if } x\neq 1\\ 1 & \text{if } x=1\end{cases}\qquad a=1$$

D_f: $x^2-1\neq 0 \Rightarrow x\neq \pm 1$. However, the function is defined at $x=1$ ($f(1)=1$).

$\boxed{D_f: x\neq -1}$

At $x=1$

✓ 1. $f(1)=1$.

✓ 2. $\lim_{x\to 1} f(x)=\lim_{x\to 1}\dfrac{x^2-x}{x^2-1}\overset{0}{\underset{0}{}}=\lim_{x\to 1}\dfrac{x\cancel{(x-1)}}{(x+1)\cancel{(x-1)}}=\dfrac{1}{1+1}=\dfrac{1}{2}$

✗ $\lim_{x\to 1} f(x)\neq f(1)$

The function has a removable discontinuity at $x=1$.

Hollow point or open point at $(1,\frac{1}{2})$

Extra I will discuss the behaviour of the function at $x=-1$

At $x=-1$

✗ $f(-1)$ is undefined

✗ $\lim_{x\to -1} f(x)=\lim_{x\to -1}\dfrac{x^2-x}{x^2-1}\overset{2}{\underset{0}{}}$ Infinite Limit $\Rightarrow$ V.A. at $x=-1$

$\to$ DNE

Infinite Discontinuity at $x=-1$

✗

Sec 2.5 #22.

$$f(x)=\begin{cases}\dfrac{2x^2-5x-3}{x-3} & \text{if } x\neq 3\\ 6 & \text{if } x=3\end{cases}\qquad a=3.$$

$-6x+1x$.

At $x=3$: ✓ 1. $f(3)=6$

✓ 2. $\lim_{x\to 3} f(x)=\lim_{x\to 3}\dfrac{2x^2-5x-3}{x-3}\overset{0}{\underset{0}{}}=\lim_{x\to 3}\dfrac{(2x+1)\cancel{(x-3)}}{\cancel{x-3}}=7$

✗ $\lim_{x\to 3} f(x)\neq f(3)$