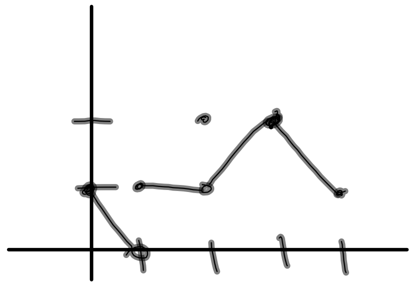
2.3 Continuity

no holes or asymptotes



continuous everywhere except $x=1, 2$

$[0,1)\cup(1,2)\cup(2,4]$

$\lim_{x\to c} f(x)$ exists: everywhere except $x=1$

$(0,1)\cup(1,4)$

Sep 15-11:26 AM

<u>RS#23</u> $f(x)$ is continuous @ $x=c$ if

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

<u>Discontinuity</u>

1. Jump: one-sided limits exist but $\neq$
2. Removable: the limit @ that value exists but $f(c)\neq\lim_{x\to c} f(x)$.
3. Infinite: asymptote

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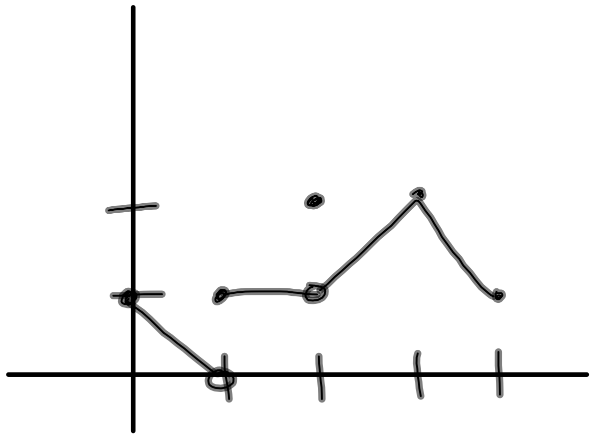

$x = 1$ Jump $\lim_{x \to 1} f(x)$ DNE

$x = 2$ Removable $f(2) \neq \lim_{x \to 2} f(x)$

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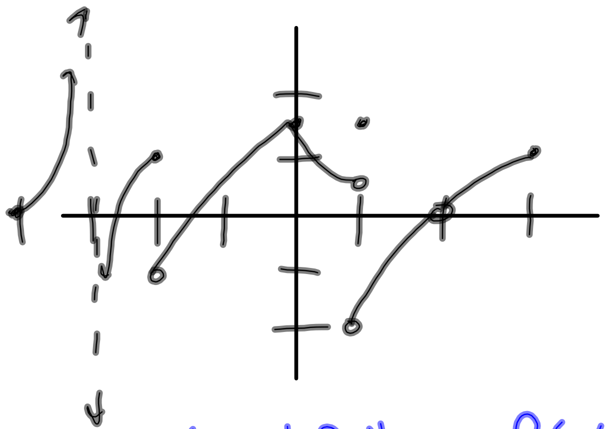

$x = -6$ Infinite $f(-6)$ DNE

$x = -4$ Jump $\lim_{x \to -4} f(x)$ DNE

$x = 2$ Jump $\lim_{x \to 2} f(x)$ DNE

$x = 4$ Removable $f(4) \neq \lim_{x \to 4} f(x)$

OR

$f(4)$ DNE

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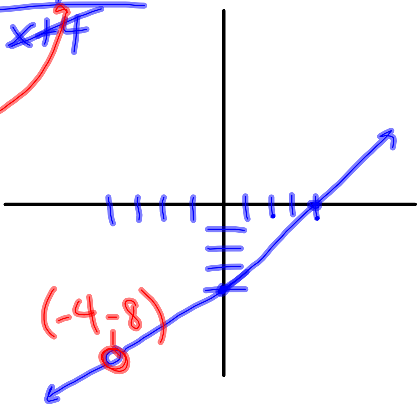
Extended Fnc

$$f(x)=\frac{x^2-16}{x+4}=\frac{\cancel{(x+4)}(x-4)}{\cancel{x+4}}$$

Hole: $x+4=0$
$x=-4$

$$g(x)=\begin{cases}\frac{x^2-16}{x+4}, & x\neq -4\\ -8, & x=-4\end{cases}$$



Continuous Fnc:

A fnc. that is cont. on every pt. in the domain.

* $f(x)=\sin(x^2) \Rightarrow$ cont.

sinx cont. x^2 cont

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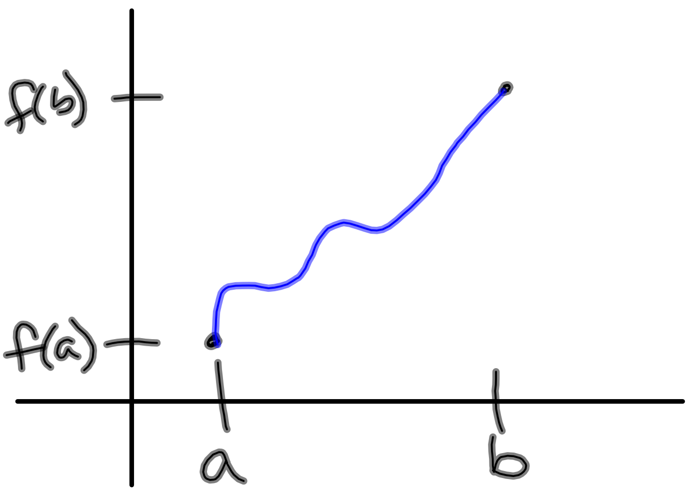
IVT



If f(x) is cont. over [a,b] then the fnc takes on every y-val. from f(a) to f(b).

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