What you'll Learn About

- How the derivative might fail to exist
- Differentiability implies local linearity
- Differentiability implies Continuity

continuous has a slope

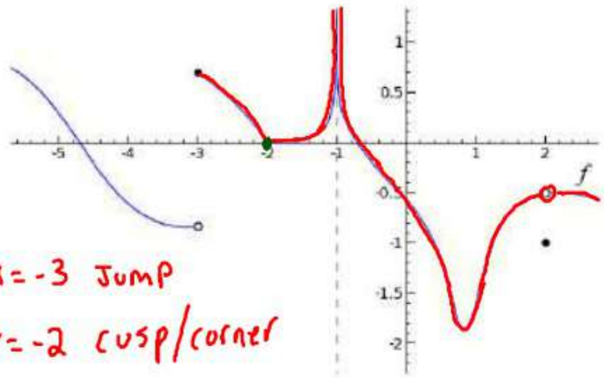
$(-\infty,-3)\cup(-3,-2)\cup(-2,-1)\cup(-1,2)\cup(2,\infty)$

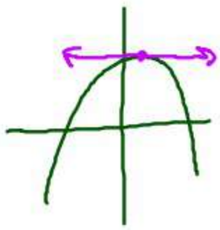
you can draw a tangent line

a. Find all points where the function, f(x), is differentiable.

$x=-2$ b. Find all points where the function is continuous, but not differentiable.

$x=2, x=-1, x=-3$ c. Find all points where the graph is neither continuous nor differentiable.





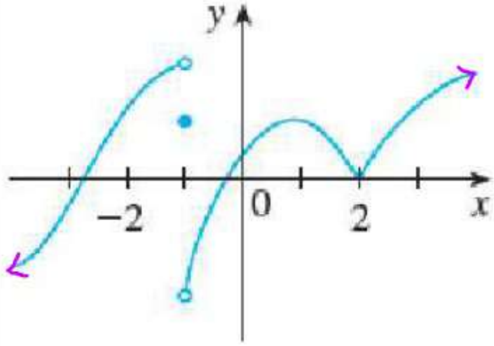
$x=-3$ Jump

$x=-2$ cusp/corner

$x=-1$ VA

$x=2$ Hole

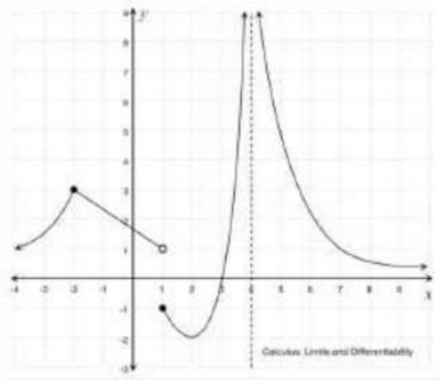
$x=-1$ not continuous not differentiable



$x=2$ continuous not differentiable

3.2 Differentiability:

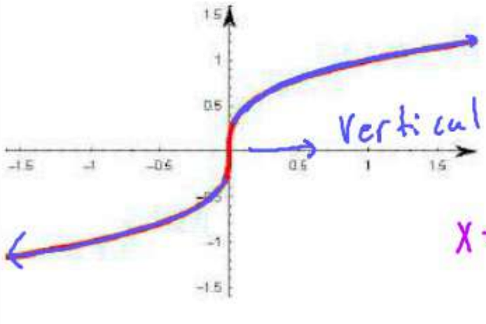
a. Find all points where the function, f(x), is differentiable.
b. Find all points where the function is continuous, but not differentiable.
c. Find all points where the graph is neither continuous nor differentiable.



$x = -2$ Continuous
Not differentiable

$x = 1, 4$ Not Continuous
Not Differentiable

$$\lim_{x \to 0} \frac{f(x) - f(a)}{x - a}$$



Vertical Tangent (No Slope)

$x = 0$ Continuous
but not differentiable