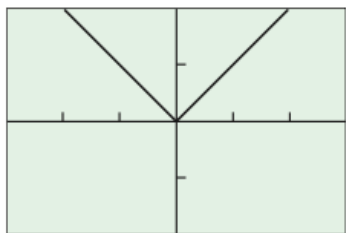
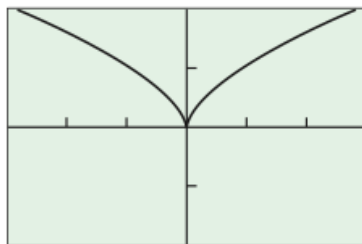


**Where  $f'(a)$  Does Not Exist**

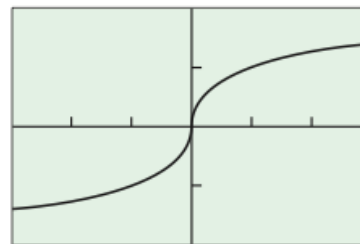
1. Corner



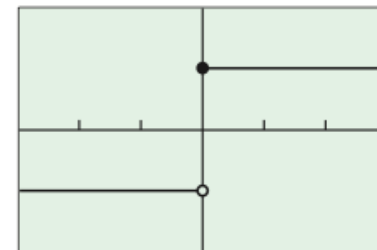
2. Cusp



3. Vertical Tangent



4. Discontinuity



1. Determine where the function is not differentiable:

a.  $f(x) = |x - 2| + 3$

b.  $q(x) = 3\cos(|x|)$

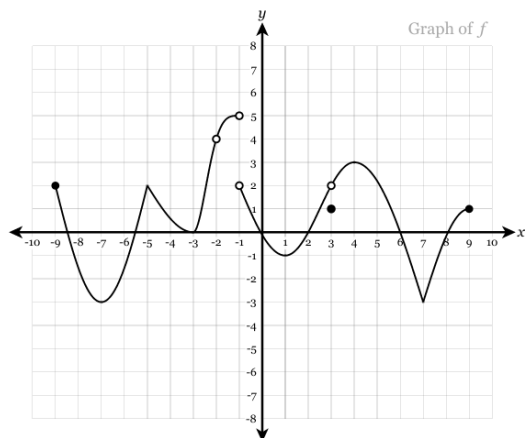
c.  $h(x) = \sqrt[3]{3x - 6} + 5$

2. Determine the values of  $a$  and  $b$  which would result in the function  $f(x)$  being differentiable at  $x = 1$ .

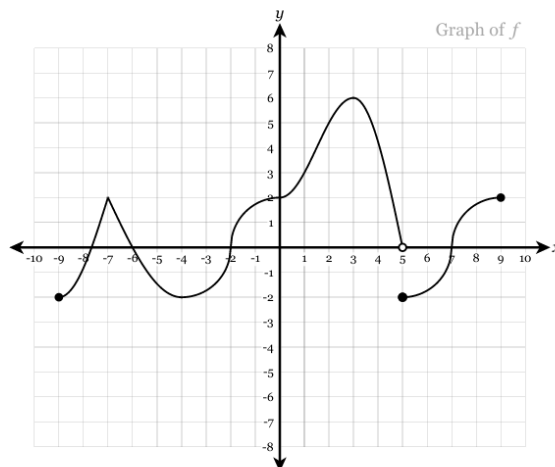
$$f(x) = \begin{cases} 3ax + 2 & \text{for } x < 1 \\ bx^2 - x - 3 & \text{for } x \geq 1 \end{cases}$$

AB Calculus  
3.2 Differentiability

3. Use the graph of the function  $f(x)$  shown below in order to determine all values of  $x$  in the interval  $-9 < x < 9$  where the function is continuous but not differentiable.



4. Use the graph of the function  $f(x)$  shown below in order to determine all values of  $x$  in the interval  $-9 < x < 9$  where the function is not differentiable.



5. Determine whether the function is differentiable, continuous, both, or neither at  $x = -4$

$$f(x) = \begin{cases} x^2 + 13x + 2, & x < -4 \\ 5x - 14, & x \geq -4 \end{cases}$$