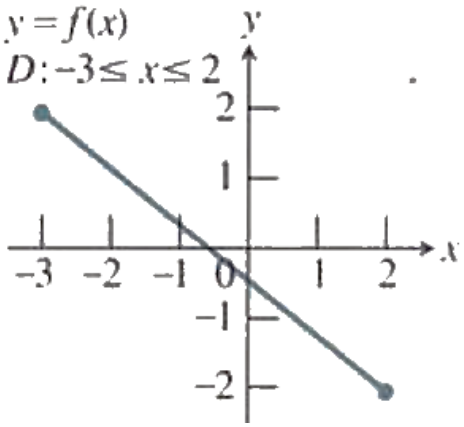
Calculus **Name:** _____

HW 20: Unit 3.4 - Where the Derivative Fails to Exist **Period:** _____

In Exercises 1-6, the graph of a function over a closed interval *D* is given. At what domain points does the function appear to be:

(a) Differentiable? (b) Continuous but not differentiable? (c) Neither continuous nor differentiable?

1.

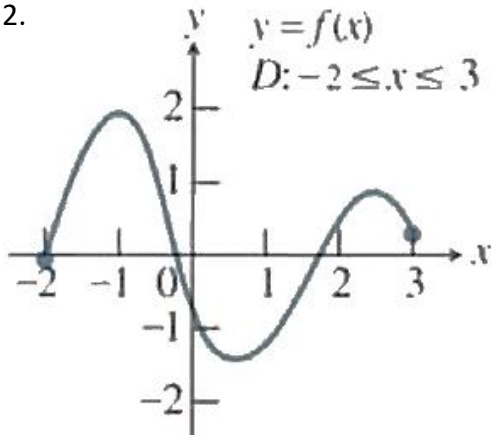


a.

b.

c.

2.

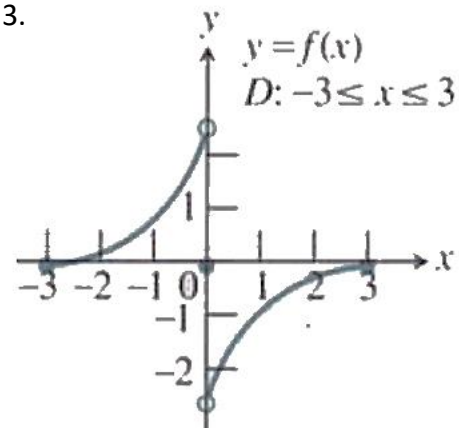


a.

b.

c.

3.

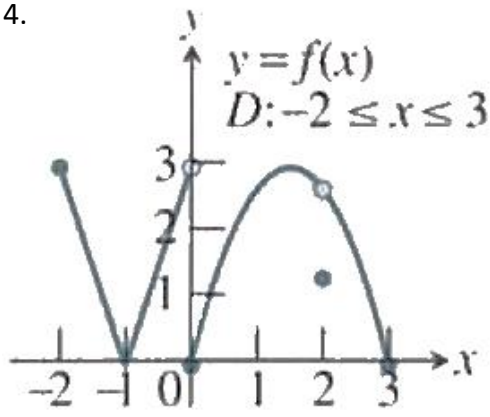


a.

b.

c.

4.

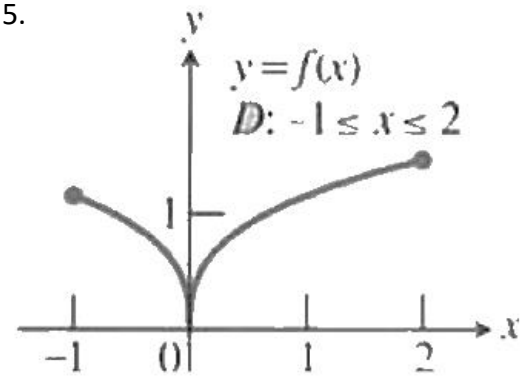


a.

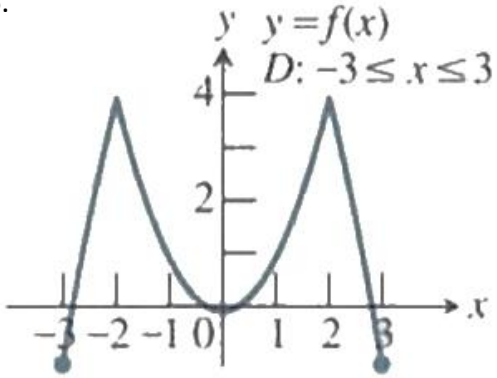
b.

c.

5.



6.



a.

b.

c.

a.

b.

c.

In Exercises 7-10, the function fails to be differentiable at *x = 0*. Tell whether the problem is a corner, cusp, vertical tangent, or a discontinuity. *Hint – Look at the graph*

7. $f(x) = x^{4/5}$

8. $f(x) = x + \sqrt{x^2} + 2$

9. $f(x) = 3 - \sqrt[3]{x}$

10. $f(x) = \sqrt[3]{|x|}$

11. Let f be the function defined as, $(x) = \begin{cases} 3 - x, & x < 1 \\ ax^2 + bx, & x \geq 1 \end{cases}$, where a and b are constants.

a. If the function is continuous for all x, what is the relationship between a and b?

b. Find the unique values for a and b that will make f continuous and differentiable?