

# Math 1210 CBE 2 Review

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UtahStateUniversity

# CBE 2

- Covers lessons 4-6
  - Definition of Derivative at a Point
  - Derivative as a Function
  - Some Derivative Formulas

# Derivatives

Definition, Graphs, and Equations

# What is a Derivative?

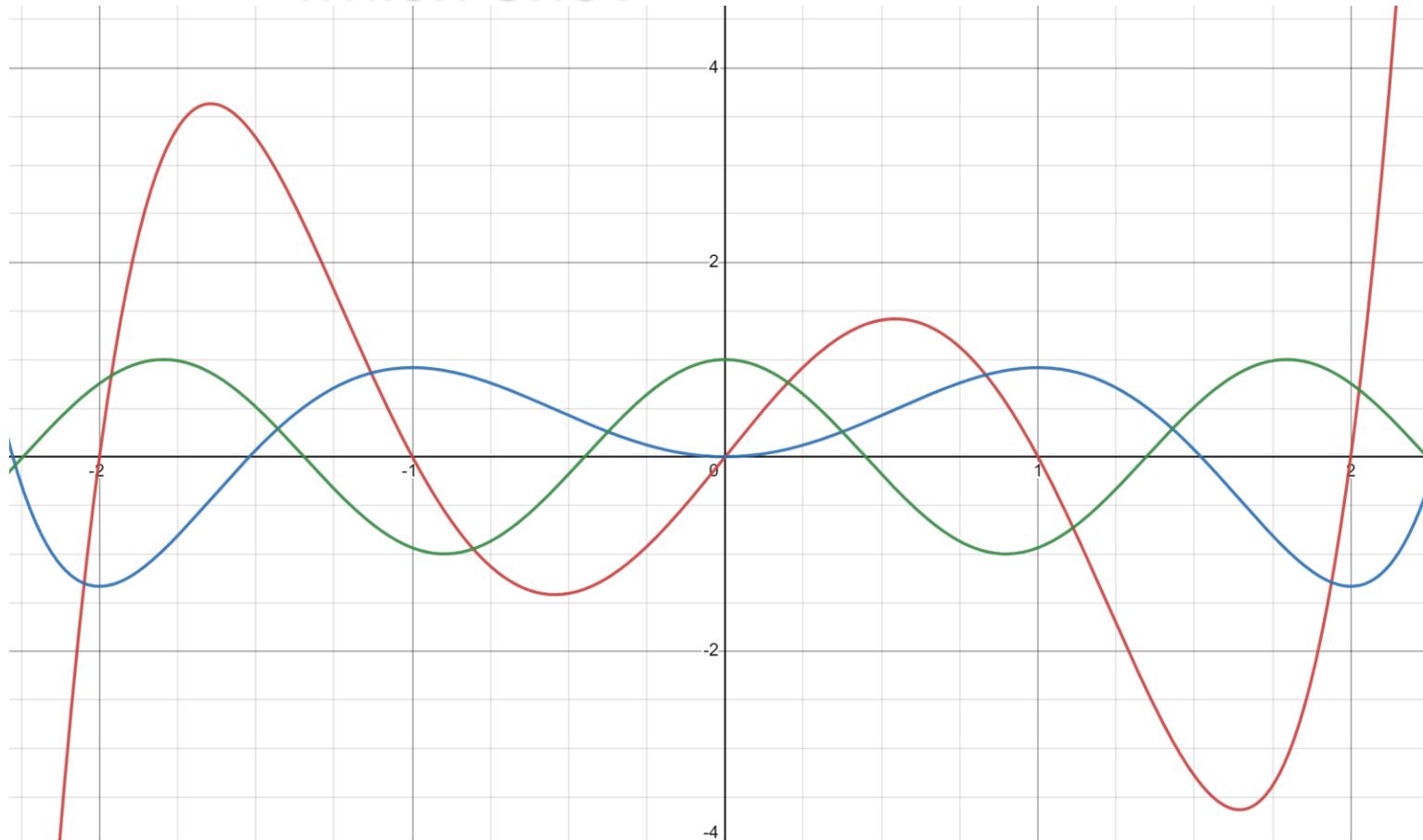
- The slope of the tangent line
- The instantaneous rate of change
- Limit definitions:

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

$$\lim_{h \rightarrow 0} \frac{f(x + h) - f(x)}{h}$$

- Notation:  $f'(x)$        $\frac{df}{dx}$

**Problem 1** One of the three curves below is the derivative of one of the other two. Which one is the derivative of which one?



**Solution: Red is the derivative of Blue**

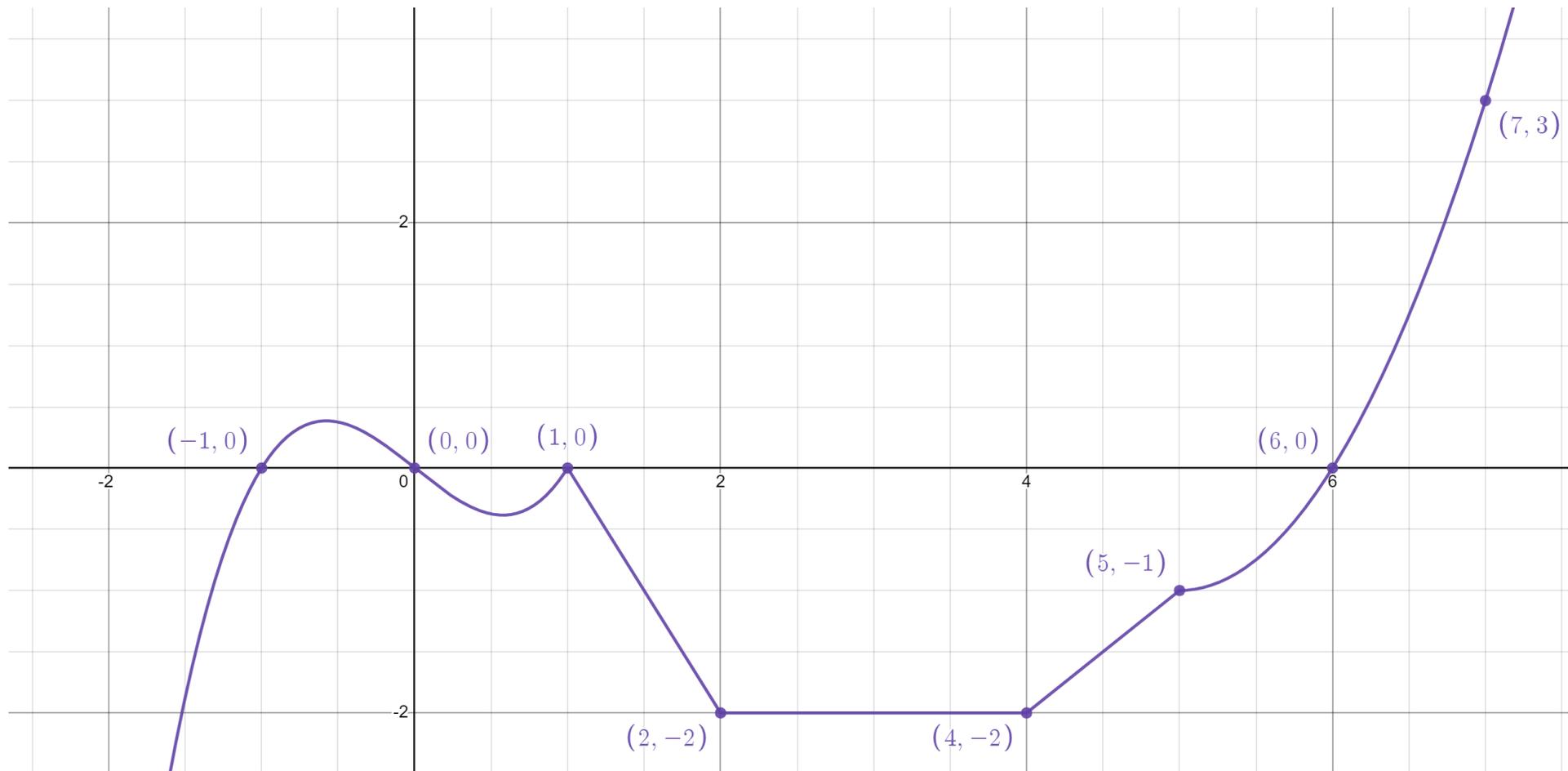
## Problem 2

- Find  $f'(2)$  for  $f(x) = 2x^5 - 3x^4 - 5x^2 + 2x - 6$

- Solution: 46

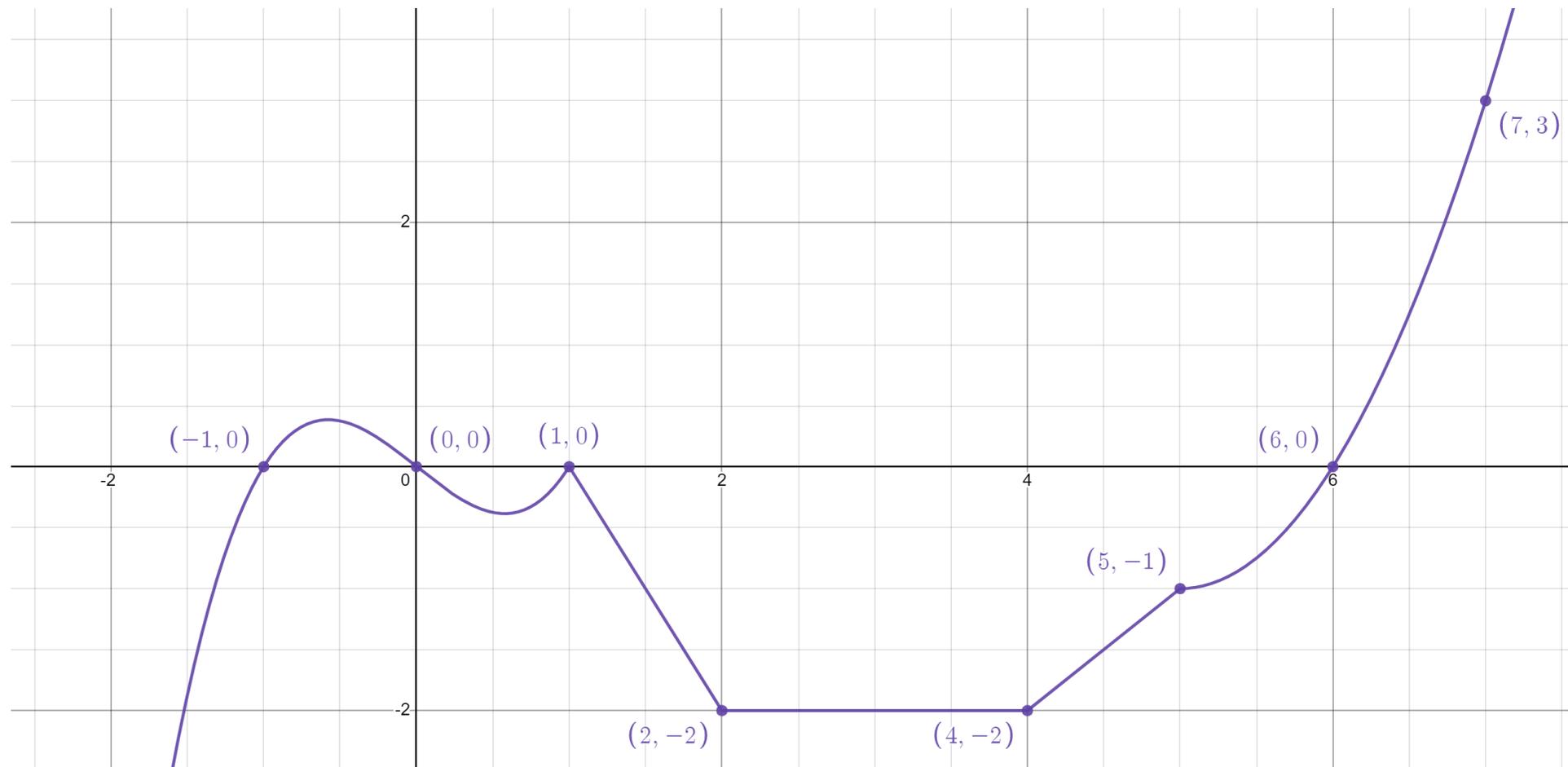
# Problem 3

Identify the x-values at which the derivative doesn't exist



**Solution:  $x = \{1, 2, 4, 5\}$**

# Problem 4 Identify from the graph $f'(4.5)$



**Solution:  $f'(4.5) = 1$**

# Product Rule

Taking the derivative of the product of two functions

$$\frac{d}{dx}(f(x)g(x)) = f'(x)g(x) + g'(x)f(x)$$

# Quotient Rule

Taking the derivative of the quotient of two functions

$$\frac{d}{dx} \left( \frac{f(x)}{g(x)} \right) = \frac{f'(x)g(x) - g'(x)f(x)}{(g(x))^2}$$

# Problem 5

- Find  $f'(0)$  for  $f(x) = x^5 e^x$

- Solution:  $f'(0) = 0$

# Problem 6

- Find  $f'(1)$  for  $f(x) = \frac{3x^4 - 2x^2 + 1}{4x^2 + 3x - 1}$

- Solution: 13/18

# Problem 7

- Find  $f'(4)$  for  $f(x) = 3x^2e^x$

- Solution:  $72e^4$

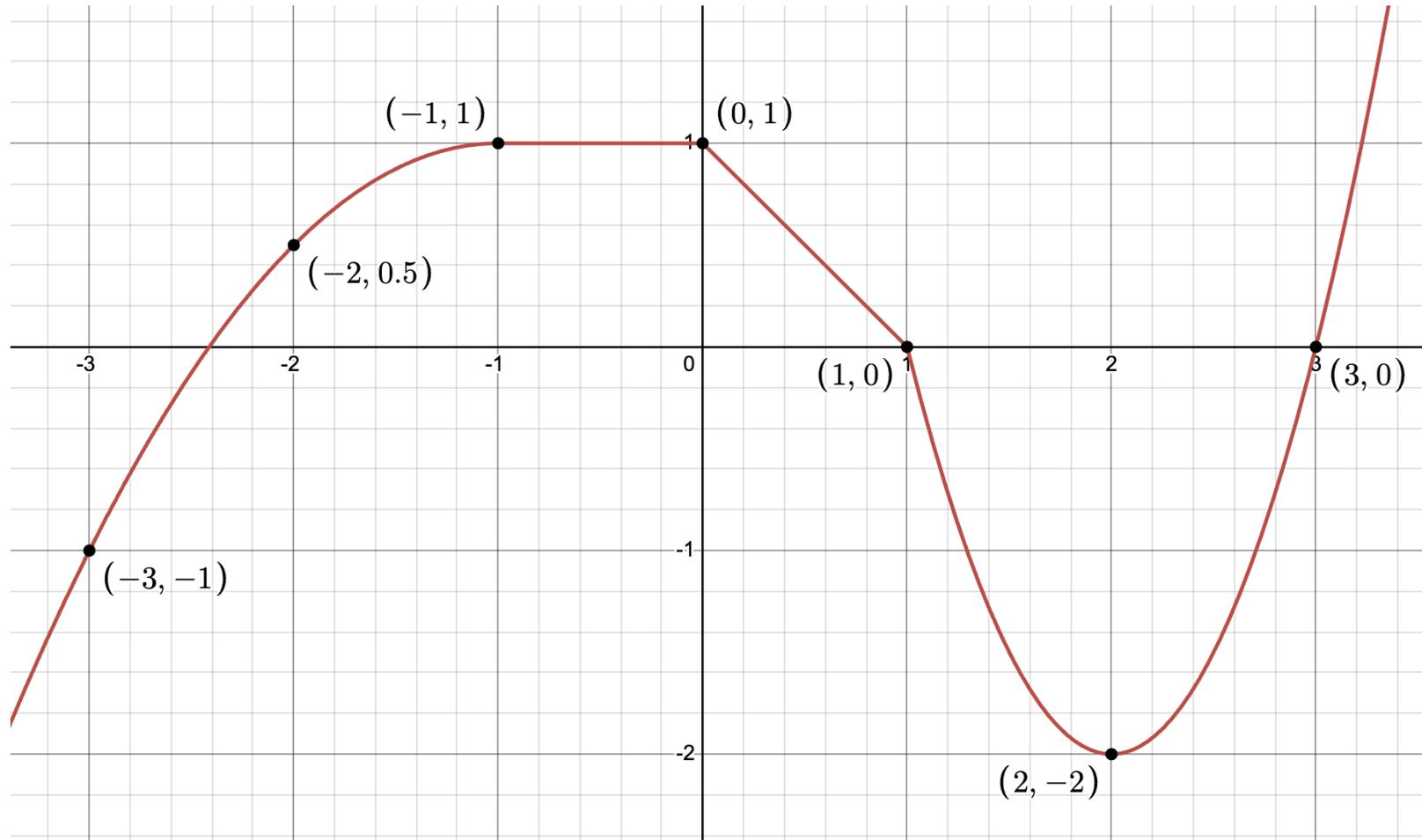
# Problem 8

- Find  $f'(1)$  for  $f(x) = \left( \frac{x^2}{2x+1} \right) \left( \frac{e^x}{x} \right)$

- **Solution:**  $f'(1) = \frac{4e}{9}$

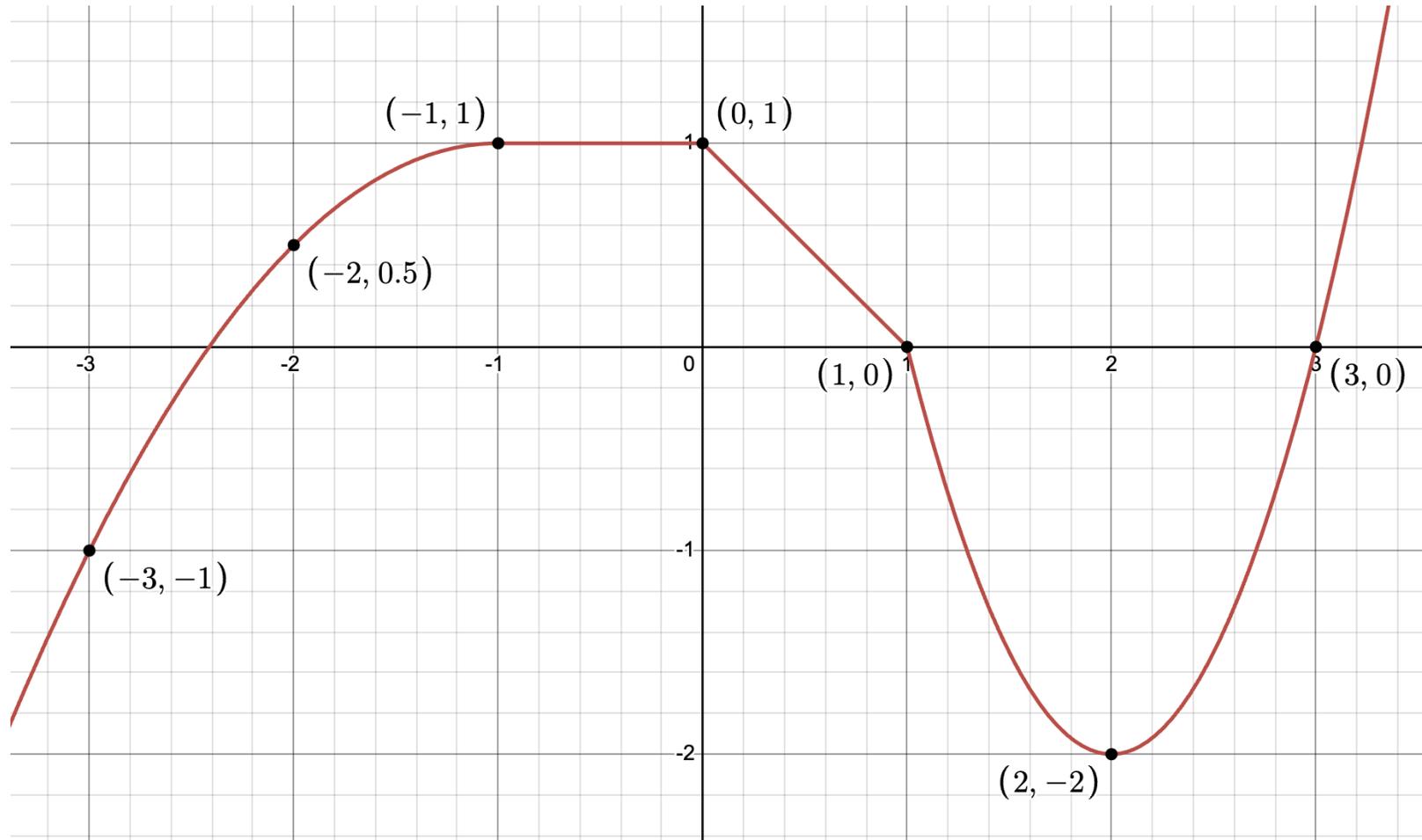
# Problem 9

For which values of  $x$  is the derivative of the following function equal to 0?



Solution:  $x = -1 < x < 0$  and  $x = 2$

**Problem 10** List in order from least to greatest for the following function.  $f'(-2)$ ,  $f'(0.5)$ ,  $f'(2)$ ,  $f'(3)$



**Solution:**  $f'(0.5)$ ,  $f'(2)$ ,  $f'(-2)$ ,  $f'(3)$

# Other resources

- Aggie Math Learning Center
  - Visit [usu.edu/math/amlc](http://usu.edu/math/amlc) for more videos, resources, tutoring times, and recitation leader office hours

