In-class Activity 4

Derivatives

Definition Write the definition of the derivative of the function $f(x)$ at $x = a$:

$f'(a) =$

Write the definition of the derivative as a function of the variable x:

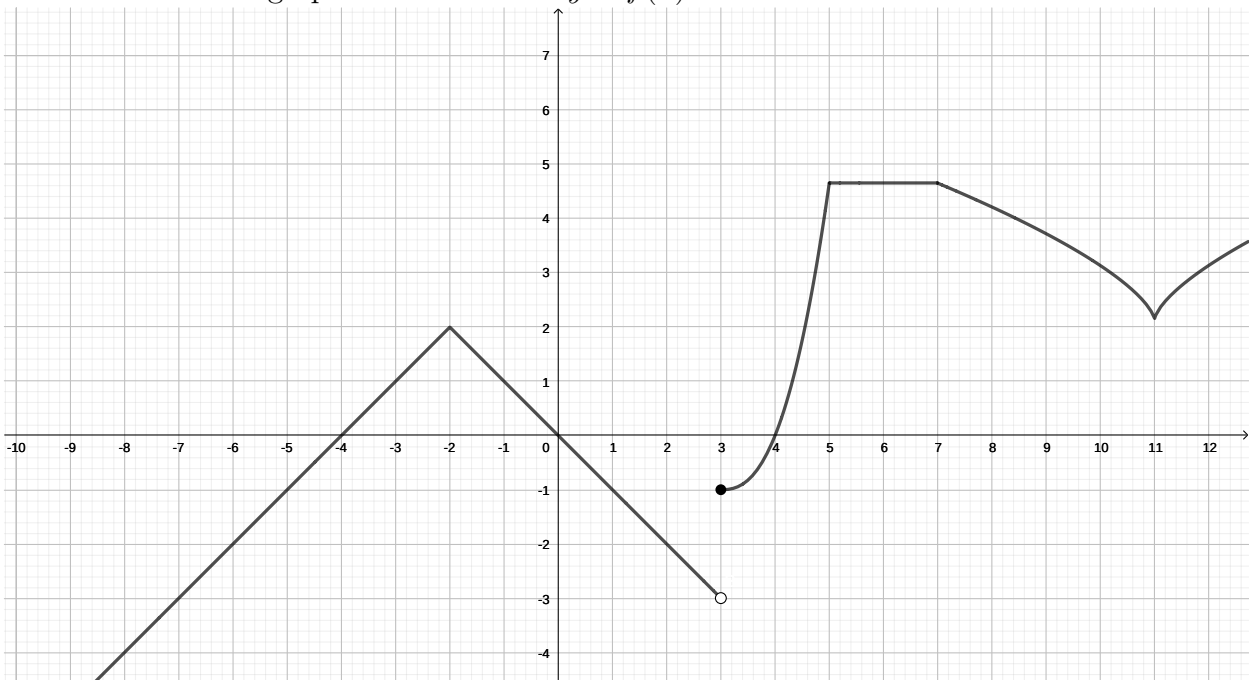
$f'(x) =$

Question 1
Using the definition of derivative, find $f'(x)$ when $f(x) = 3x^2 - x$.

Question 2
Using the definition of derivative, find $f'(x)$ when $f(x) = \sqrt{x}$.

Question 3
Using the definition of derivative, find $f'(x)$ when $f(x) = \frac{3}{x}$.

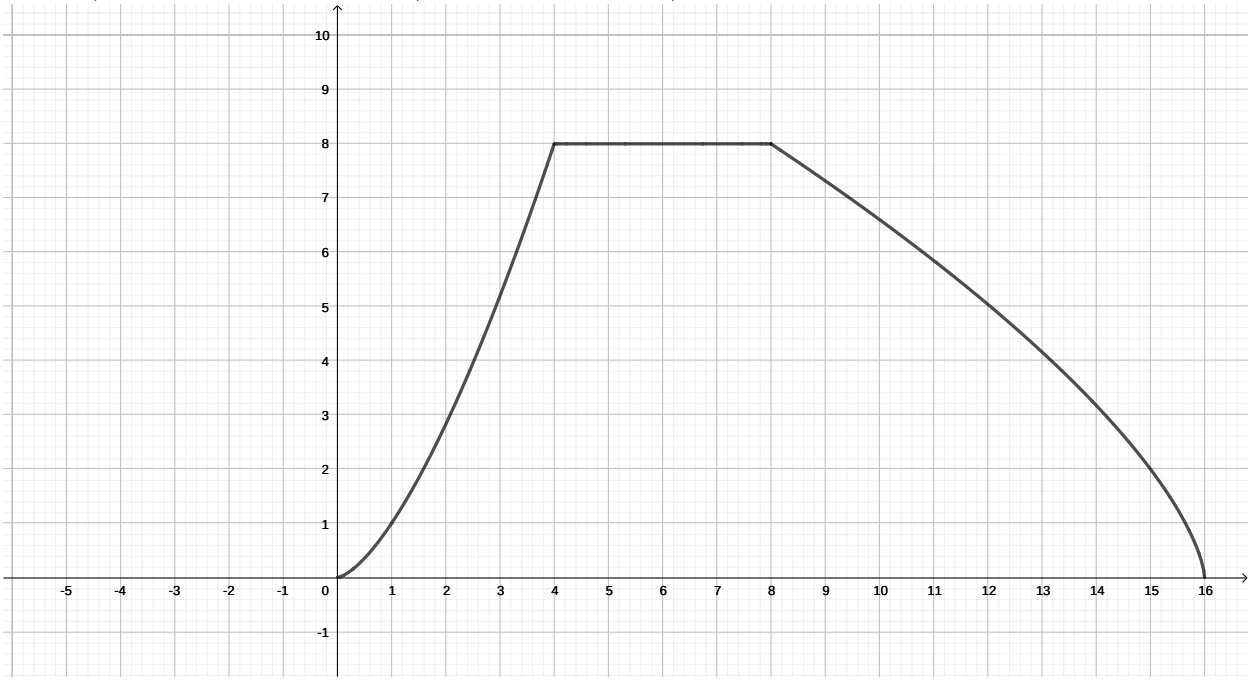
Question 4
Given below is the graph of the function $y = f(x)$.



Find all the points where f is not differentiable.

Question 5

Given below is the graph of the function $s(t)$ representing the position (measured in meters) of a person at time t (measured in hours).



- Is the person always moving? At which times is the velocity of the person equal to 0?

- What is the total displacement of the person (over the interval of time between $t = 0$ hr and $t = 16$ hr)?

- What is the average velocity of the person in this interval of time? Interpret your answer. Does this provide a good description of the motion of the person?

Question 6 Are the following functions differentiable at $x = 0$?
a) $f(x) = x|x|$

*) $g(x) = \begin{cases} x^2 \cos\left(\frac{1}{x}\right) & \text{if} \quad x \neq 0 \\ 0 & \text{if} \quad x = 0 \end{cases}$