Intervals

In this section, we will determine the interval in which the value of a function is increasing, decreasing, constant, positive, or negative. In order to do this, the graph of the function is read from the left to the right.

Increasing
To determine the interval in which the value of the function is increasing, read the graph of the function going from left to right. If the graph is rising going from left to right, the value of the function is increasing.

Decreasing
To determine the interval in which the value of the function is decreasing, read the graph of the function going from left to right. If the graph is falling going from left to right, the value of the function is decreasing.

Constant
To determine the interval in which the value of the function is constant, read the graph of the function going from left to right. If the graph is neither rising nor falling going from left to right, the value of the function is constant. In other words, we are looking for a horizontal line.

Positive
To determine the interval in which the value of a function is positive, the x intercepts of the function must be known. If any portion of the graph is above the x axis, this is the interval in which the value of the function is positive.

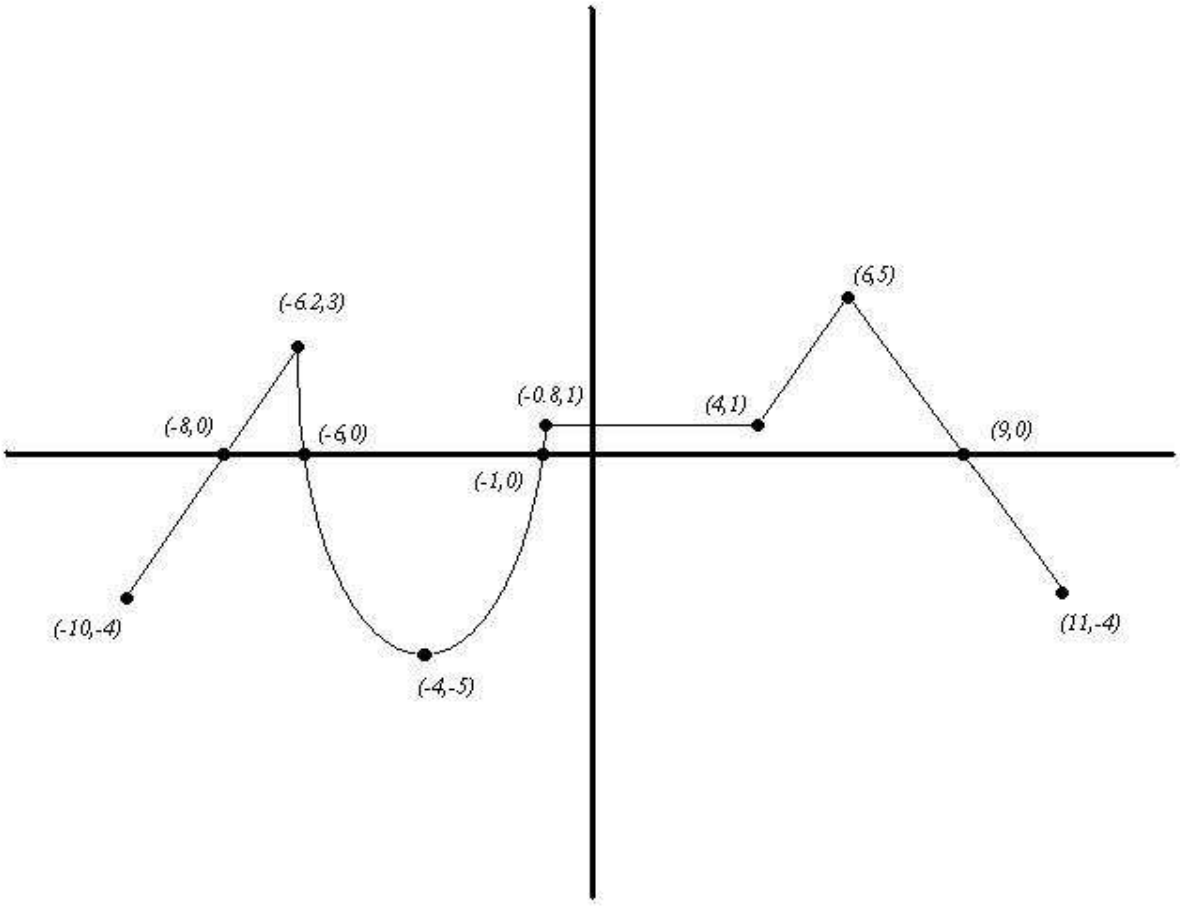
Negative
To determine the interval in which the value of a function is negative, the x intercepts of the function must be known. If any portion of the graph is below the x axis, this is the interval in which the value of the function is negative.

In the case of a parabola, it will not be necessary to see the graph to do this.

Increasing/Decreasing
The interval in which the value of a quadratic function is increasing or decreasing is based on how the parabola opens, and the x value of the vertex.

Positive/Negative
The interval in which the value of a quadratic function is positive or negative is based on the x intercepts of the graph of the function. It is also very important to keep in mind the direction in which the parabola opens. If for example, it is determined that a parabola opens down and has no x intercepts, there is no interval in which the value of the function is positive. This happens because the vertex would be below the x axis.

Here is an example of determine intervals. Notice that only the x values of the coordinates were used to describe the interval, and only parenthesis are used.



Given the above graph of a function, determine the intervals in which the value of the function is increasing, decreasing, constant, positive and negative.

The value of the function is increasing in the intervals:
(-10,-6.2), (-4,-0.8), and (4,6)

The value of the function is decreasing in the intervals:
(-6.2,-4) and (6,11)

The value of the function is constant in the interval:
(-0.8, 4)

The value of the function is positive in the intervals:
(-8,--6) and (-1, 9)

The value of the function is negative in the intervals:
(-10,-8), (-6,-1) and (9,11)

The reason parenthesis must be used when describing these intervals and not brackets is in the meaning of each symbol when using interval notation. A bracket means inclusive. Notice for example the intervals in which the value of the function is increasing and decreasing. The x value of -6.2 is used in both instances. If there had been brackets by the -6.2, it would be stating that the value of the function is both increasing and decreasing at the same time when x is -6.2.

When asked to determine the interval in which the value of the function is increasing, the y values of the function are not used to describe these intervals. The reason these values are not used is because of the question itself. The y coordinates of a function are the values of the function. The question is asking where this is happening, not what the actual values are.

<u>A couple of guidelines to intervals</u>
Make sure to only use the x values of the function to describe the interval.
Never use brackets when answering these types of questions.