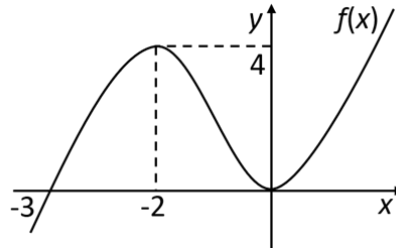


## CALCULUS 9: QUIZ SOLUTIONS

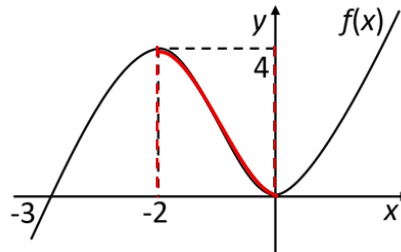
### Question 1

The graph of  $f(x)$  is shown in the diagram. For which values of  $x$  is  $f(x)$  decreasing?



- A.  $-3 < x < -2$       B.  $-2 < x < 0$       C.  $0 < x < 4$       D.  $4 < x < \infty$

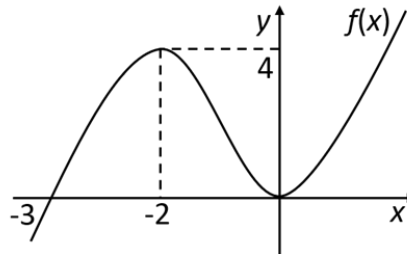
### Solution



As shown in this diagram,  $f(x)$  decreases from 4 to 0 as  $x$  increases from -2 to 0. So, the correct answer is B.

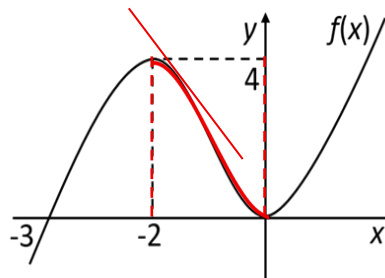
### Question 2

The graph of  $f(x)$  is shown in the diagram. For what values of  $x$  is  $f'(x) < 0$ ?



- A.  $0 < x < \infty$       B.  $0 < x < 4$       C.  $-2 < x < 0$       D.  $-3 < x < -2$

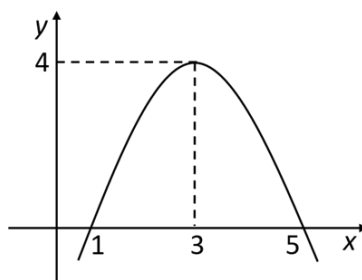
### Solution



As shown in this diagram, the gradient is negative, that is,  $f'(x) < 0$ , between the values  $x = -2$  and  $x = 0$ . So, the correct answer is C.

**Question 3**

The graph of  $f(x) = -x^2 + 6x - 5$  is shown in the diagram. For which interval is the function increasing?



- A.  $(-\infty; 3)$       B.  $[1; 5]$       C.  $(3; 5]$       D.  $[5; \infty)$

**Solution**

The function is increasing between  $x = -\infty$  and  $x = 3$ .  
So, the correct answer is A.

**Question 4**

Is the function  $f(x) = x^3 - 3x$  increasing, decreasing or stationary over the interval  $(1; \infty)$ ?

- A. Increasing      B. Decreasing      C. Stationary

**Solution**

We need to know the gradient for the interval  $(1; \infty)$ , i.e.,  $x > 1$ .

$$f(x) = x^3 - 3x$$

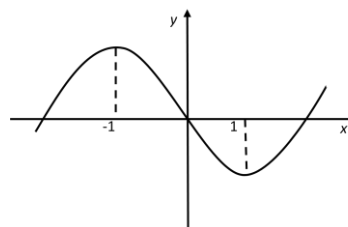
$$f'(x) = 3x^2 - 3$$

$$\text{When } x = 1, f'(x) = 0$$

$$\text{When } x > 1, \text{ then } f'(x) > 0$$

So, the correct answer is A.

Sketch the curve for more details

**Question 5**

For what value of  $x$  does the function  $f(x) = 3x - 2x^2$  have a stationary value?

- A.  $\frac{4}{3}$       B.  $\frac{3}{2}$       C.  $\frac{2}{3}$       D.  $\frac{3}{4}$

**Solution**

$$f(x) = 3x - 2x^2$$

$$\therefore f'(x) = 3 - 4x, \text{ which is zero for all stationary values.}$$

$$\text{i.e., } 3 - 4x = 0$$

$$\therefore x = \frac{3}{4}$$

So, the correct answer is D.