Consider the function $y = x^2 – 2x – 15$ and determine the following:

a. Whether the function has a minimum or a maximum

b. Minimum or a maximum value of the function

c. Crossing points of the graph in x-axis

d. The intercept

Solution:

a) $y = x^2 – 2x – 15$ or $f(x) = x^2 – 2x – 15$;

The first step we take the first derivative of a function f(x) and equate it to zero.

$f'(x) = 2x-2$ then $2x-2 =0$; and $x = 1$;

$x = 1$ is the critical value.

$f(x) = x^2 – 2x – 15$; $f(1) = 1^2 – 2 \cdot 1 – 15 = – 16$

The extreme value is −16.

$f''(x)= 2$; $f''(x)$ evaluated at the critical value 1.

$f''(1) = 2$ and $2>0$. It means that the critical value 1 determines a minimum.

b) In point (1, −16) the function has a minimum; −16 is the minimum value of function f(x).

c) x- intercept is the point where a line crosses the x-axis. It crosses the x-axis when y=0 or f(x) =0;

$x^2 – 2x – 15 =0$

$(x+3)(x–5)=0$

$x= –3$ or $x=5$

d) y- intercept is the point where a line crosses the y-axis. It crosses the y – axis when x=0;

$y = x^2 – 2x – 15$; when x=0; then $y= – 15$;