If we divide f(x) by x-c, then the remainder will be equal to f(c)

Factor Theorem:

If we divide f(x) by x-c and the remainder is zero, then x-c is a factor of f(x).

Equivalently, if f(c) = 0, then x-c is a factor of f(x).

E.g. Consider
$$f(x) = x^4 - 26x^2 + 25$$

Q1: In x-5 a factor of
$$f(x)$$
?

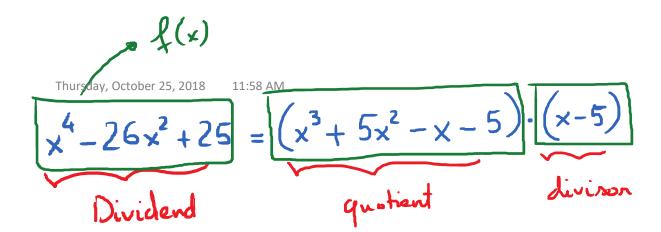
(Is 5 a zero of $f(x)$)

Sol: If 5 is a zero of f(x), then f(5) = 0. Hence, by the remainder theorem, if we divide f(x) by x-5, we should get a remainder of 0.

_ We divide $x^4 - 26x^2 + 25$ by x - 5 using synthetic division.

Since Remainder = 0, 5 is a zero of f(x); in other words, x-5 is a factor of f(x).

Q2: Find the other factor of f(x)?



So, the other factor of f(x) is $x^3 + 5x^2 - x - 5$.

Q3: Find all the remaining zeros of f(x)?

Set
$$x^3 + 5x^2 - x - 5 = 0$$

 $x^2(x+5) - (x+5) = 0$
 $(x+5)(x^2 - 1) = 0$
 $(x+5)(x+1)(x-1) = 0$
 $(x+5)(x+1)(x-1) = 0$

E.g. Consider
$$g(x) = x^3 - 3x^2 - 6x + 8$$

Q1: Use synthetic division to determine if -2 is a zero of g.

Q2: Find the other zeros.

So, -2 is a zono of q.

Q2:
$$x^2-5x+4=0 \rightarrow (x-1)(x-4)=0$$

So, $x=1$; $x=4$ are the other zeros of g.