Question

Factor $p(x) = x^3 + 3x^2 - 16x - 48$ then state the zeros of the polynomial function.

Solution

Group the first two terms together and then the last two terms together.

$$x^3 + 3x^2 - 16x - 48 = (x^3 + 3x^2) - (16x - 48).$$

Two groups of two terms.

Factor out a Greatest Common Factor from each separate binomial.

$$(x^3 + 3x^2) - (16x - 48) = x^2(x + 3) - 16(x + 3)$$

*Factor out an x squared from the 1st ( )
*Factor out a 2 from the 2nd ( ) .

Factor out the common multiplier.

$$x^2(x + 3) - 16(x + 3) = (x + 3)(x^2 - 16) = (x + 3)(x - 4)(x + 4)$$

Find the zeros of the polynomial function

$$(x + 3)(x - 4)(x + 4) = 0$$

$x + 3 = 0,$ $x - 4 = 0,$ $x + 4 = 0,$

$x = -3,$ $x = 4,$ $x = -4.$

So, we've got 3 zeroes:

$$x=-4, x=-3, x=4.$$

Answer:

$x^3 + 3x^2 - 16x - 48 = (x + 3)(x - 4)(x + 4)$, zeroes are $x=-4, x=-3, x=4$.