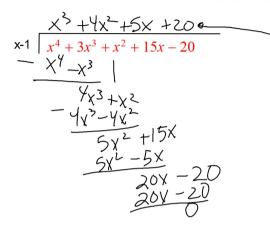
$$x^4 + 3x^3 + x^2 + 15x - 20 = 0$$

Find all four Complex Solutions (real and imaginary) by doing the following: a. Find all real solutions by graphing then, Real solutions are 1. -4

## Therefore, factors of the original polynomial are (x-1) and (x+4)

b. Use the real zeros to find the remaining imaginary solutions using division.

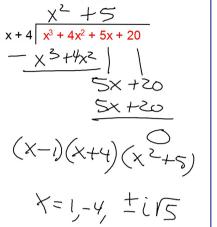


this quotient is, therefore, another factor of the original dividend.

another option: if these are factors: (x-1) and (x+4) Then  $(x-1)(x+4) = x^2 + 3x - 4$  is also a factor. This means you could divide the original dividend by the product of the two original factors:

this will lead to the same third factor  $x^2 + 5$ 

after dividing by x-1 you could take that resulting quotient and divide by the other factor (x+4):



after dividing by x-1 you could try factoring the quotient  $x^3 + 4x^2 + 5x + 20$ by using the box:

$$\frac{x}{x^{3}} + \frac{4}{4}$$

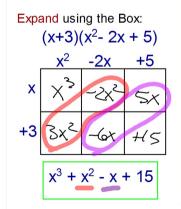
This leads to the same factors

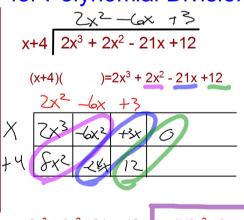
$$(x-1)(x+4)(x^2+5)$$

which will lead to the same solutions:

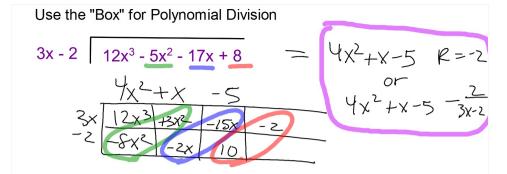
## Using the "Box" for Polynomial Division

OR





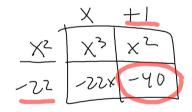
$$2x^3 + 2x^2 - 21x + 12 = (x+4)(2x^2 - 6x + 3)$$



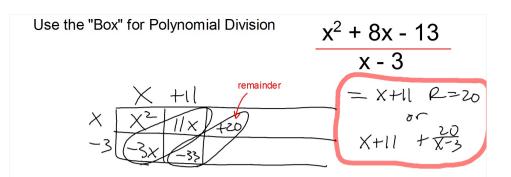
If x + 2 is a factor, use polynomial division to factor  $x^3 + x^2 - 22x - 40$  completely.

Since you are trying to factor a polynomial with four terms you could try using the box right away.

Remember, as a check when you are factoring using the box is that the constants of your factors (+1 and -22) should multiply to the constant inside the box (-40). Since (+1)x(-22) doesn't equal -40, this polynomial can't be factored using the box.

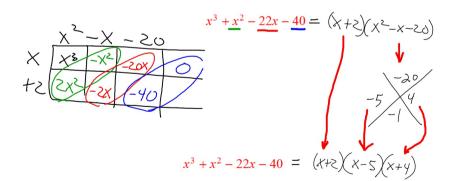


This attempt at using the box doesn't work!



If x + 2 is a factor, use polynomial division to factor  $x^3 + x^2 - 22x - 40$  completely.

Since factoring using the box doesn't work try doing polynomial division.



Given 
$$f(x) = x^3 - 5x^2 + 8x - 11$$

Find 
$$f(-3) = (-3)^3 - 5(-3)^2 + 5(-3) - 11 = -707$$