

For what c is $x+3$ a factor of $p(x) = x^3 + c x^2 + 5x + 15$?

$$p(x) = (x+3)(q(x)) + R$$

$$p(-3) = R \rightarrow \text{If } R=0, x+3 \text{ is a factor}$$

$$p(-3) = (-3)^3 + c(-3)^2 + 5(-3) + 15 = 0$$

$$-27 + 9c - 15 + 15 = 0$$

$$9c = 27$$

$$c = 3$$

$$p(x) = x^3 + 3x^2 + 5x + 15$$

or

$$p(x) = (x+3)(x^2+5)$$

For what b is $(x-6)$ a factor of $f(x) = x^3 + b x^2 + 3x - 18$?

$$f(x) = (x-6)q(x) + R$$

$$\text{If } R=0, x-6 \text{ is a factor}$$

$$f(6) = R = 0$$

~~$$f(6) = 6^3 + b(6)^2 + 3(6) - 18 = 0$$~~

$$f(6) = 6^3 + b(6)^2 + 3(6) - 18 = 0$$

$$216 + 36b + 18 - 18 = 0$$

$$36b = -216$$

$$b = -6$$

$$f(x) = x^3 - 6x^2 + 3x - 18$$

or

$$f(x) = (x-6)(x^2+3)$$