Answer on Question #55855 – Math – Calculus

Is the given linear expression a factor of the polynomial? Show your work.

13: f(x) = 2x^3 + x^2 -5x + 2
Yes

14: g(x) = 3x^3 + 2x^2 -17x + 6; x + 3
No

15: h(x) = x^4 -4x^3 -15x^2 + 58x -40; x – 5
yes

Solution

13. We have f(x) = 2x^3 + x^2 -5x + 2.
$2x^3 + x^2 -5x + 2 = 0.$
A root of the equation will be divisors of 2.
2: $\pm 1, \pm 2$. Substitute in polynomial f(x)

$$2 * 1^3 + 1^2 - 5 * 1 + 2 = 0$$

So, 1 is the root of the polynomial.

$2x^3 + x^2 - 5x + 2$ | $x - 1$
$-$ | $2x^2 + 3x - 2$
$2x^3 - 2x^2$
$3x^2 - 5x + 2$
$-$
$3x^2 - 3x$
$- 2x + 2$
$-$
$-2x + 2$
0

because the remainder is 0, 1 really is the root.
$2x^2 + 3x - 2 = 0$ is a quadratic equation.
Its roots are

$x = \frac{-3-\sqrt{9-4\cdot 2\cdot(-2)}}{2\cdot 2} = \frac{-3-5}{4} = \frac{-8}{4} = -2$ and
$x = \frac{-3+\sqrt{9-4\cdot 2\cdot(-2)}}{2\cdot 2} = \frac{-3+5}{4} = \frac{2}{4} = \frac{1}{2}$.

Then $x_2 = -2. x_3 = 1/2.$
Answer: $x_1 = 1, x_2 = -2. x_3 = 1/2$

14.

$3x^3 + 2x^2 - 17x + 6 \mid x + 3$

$3x^3 + 9x^2 \quad\quad 3x^2 - 7x + 4$

$-7x^2 - 17x + 6$

$-7x^2 - 21x$

$4x + 6$

$4x + 12$

-6

So, -3 is not a root.

15.

$x^4 - 4x^3 - 15x^2 + 58x - 40 \mid x - 5$

$x^4 - 5x^3 \quad\quad x^3 + x^2 - 10x + 8$

$x^3 - 15x^2 + 58x - 40$

$x^3 - 5x^2$

$-10x^2 + 58x - 40$

$-10x^2 + 50x$

$8x - 40$

$8x - 40$

0

So, 5 is a root.