Answer on Question #75922 – Math – Algebra

Question

The polynomial $f(x) = 2\cdot x^2+k\cdot x^2-3\cdot x+5$ and $g(x) = x^3+2\cdot x^2-x+k$ when divided by (x-2) leave two remainders r_1 and r_2 respectively. Find the value of ''k'' if $r_1-r_2=0$.

Solution

Division polynomial f(x) by (x-2):

$$\begin{array}{rl} & \underline{x\cdot (2 + k) + (1 + 2\cdot k)} \\ (x - 2)\,|\, & x^2\cdot (2 + k)-3\cdot x + 5 \\ & \underline{x^2\cdot (2+k)-2\cdot(2+k)\cdot x} \\ & 0 \qquad x\cdot (1 + 2\cdot k) + 5 \\ & \underline{0 \qquad x\cdot (1 + 2\cdot k) - 2\cdot (1 + 2\cdot k)} \\ & 0 \qquad 0 \qquad \mathbf{5 + 2\cdot (1+2\cdot k)} \end{array}$$

$r_1 = 5+2\cdot(1+2\cdot k) = 5 + 2 + 4\cdot k = 7 + 4\cdot k$

Division polynomial g(x) by (x-2):

$$\begin{array}{rl} & \underline{x^2 + 4\cdot x + 7} \\ (\, x - 2\,)\,|\, & x^3 + 2\cdot x^2 - x + k \\ & \underline{x^3 - 2\cdot x^2 \qquad\qquad} \\ & 0 \quad 4\cdot x^2 - x + k \\ & \underline{0 \quad 4\cdot x^2 - 8\cdot k} \\ & 0 \quad 0 \quad 7\cdot x + k \\ & \underline{0 \quad 0 \quad 7\cdot x - 14} \\ & 0 \quad 0 \quad 0 \quad \mathbf{14 + k} \end{array}$$

$r_2 = 14 + k$

Find k

$$r_1 - r_2 = 0$$

$$7 + 4 \cdot k - 14 - k = 0$$

$$3 \cdot k = 7$$

$$k = \frac{7}{3}$$

Answer: $k = \frac{7}{3}$.