

Without actual division prove that  $2x^4 - 5x^3 + 5x - 2$  are divisible by  $x^2 - 3x + 2$ .

**Solution:** Solve the equation  $x^2 - 3x + 2 = 0$ , we have roots  $x_1 = 1, x_2 = 2$ .

Let  $f(x) = 2x^4 - 5x^3 + 5x - 2$ , then  $f(x_1) = f(1) = 2 - 5 + 5 - 2 = 0$ ,  $f(x_2) = f(2) = 2 \cdot 16 - 5 \cdot 8 + 5 \cdot 2 - 2 = 0$ .

So as soon as  $f(x_1) = 0$  and  $f(x_2) = 0$  that  $2x^4 - 5x^3 + 5x - 2$  are divisible by  $x^2 - 3x + 2$ .