Long Division & Synthetic Division

Divide $f(x) = 2x^3 + 9x^2 + 14x + 5$ by $x - 3$

$$2x^2 + 15x + 59 + \frac{182}{x-3}$$

$$x-3 \overline{)\,2x^3 + 9x^2 + 14x + 5}$$

$$-2x^3 + 6x^2$$

$$15x^2 + 14x$$

$$-15x^2 + 45x$$

$$59x + 5$$

$$-59x + 177$$

$$182$$

Evaluate $f(x) = 2x^3 + 9x^2 + 14x + 5$ when $x = 3$

3	2	9	14	5
	↓	6	45	177
	2	15	59	182

$$2x^2 + 15x + 59 + \frac{182}{x-3}$$

Divide using synthetic division:

$(2x^2 - 7x + 10) \div (x - 5)$ → Put a "5" outside

5	2	-7	10
	↓	10	15
	2	3	25

$$2x + 3 + \frac{25}{x-5}$$