

1)

$$\frac{(3+5i)^2}{1-2i} = \frac{-16+30i}{1-2i} \frac{1+2i}{1+2i} = -\frac{76}{5} - \frac{2}{5}i$$

2)

$$z = 1 + i\sqrt{3} = 2e^{i\frac{\pi}{3}} \implies z^6 = 64$$

3)

$$\frac{3+2i}{2-i} = \frac{\sqrt{13}e^{i33.69^\circ}}{\sqrt{5}e^{-i26.56^\circ}} = \sqrt{\frac{13}{5}}e^{i60.25^\circ}$$

4)

$$x^3 + 2x^2 - 11x - 12 = (x+1)(x^2 + x - 12)$$

Autres racines : $x = 3$ et $x = -4$

5)

$$\frac{x^4}{x^2-1} = x^2 + 1 + \frac{1}{x^2-1}$$

$$\frac{x^4}{x^2-1} = x^2 + 1 + \frac{A}{x-1} + \frac{B}{x+1} = x^2 + 1 + \frac{1/2}{x-1} - \frac{1/2}{x+1}$$

6)

$$\lim_{x \rightarrow +\infty} \frac{x^2 - x}{9x^5 - 6x^2 + 7} = 0$$

$$\lim_{x \rightarrow 2} \frac{x^2 - 4}{x^2 - 3x + 2} = \lim_{x \rightarrow 2} \frac{(x+2)(x-2)}{(x-1)(x-2)} = \lim_{x \rightarrow 2} \frac{x+2}{x-1} = 4$$

$$\lim_{x \rightarrow 3+} \frac{1-4x}{x-3} = -\infty$$

7)

$$\ddot{y}(t) + 5\dot{y}(t) + 6y(t) = 0$$

with: $y(0^-) = 2$; $\dot{y}(0^-) = 3$

$$(p^2 Y(p) - 2p - 3) + 5(p Y(p) - 2) + 6 Y(p) = 0$$

$$(p^2 + 5p + 6) Y(p) = 2p + 13$$

$$Y(p) = \frac{2p + 13}{p^2 + 5p + 6}$$

$$Y(p) = \frac{2p + 13}{(p + 2)(p + 3)}$$

$$Y(p) = \frac{A}{p + 2} + \frac{B}{p + 3}$$

$$A = 9 \quad ; \quad B = -7$$

$$Y(p) = \frac{9}{p + 2} - \frac{7}{p + 3}$$

$$y(t) = 9e^{-2t} - 7e^{-3t}$$