

UE PIC - Math Refresher Course

– Duration: 1h30 –

- 1) Compute the real and imaginary part of $z = \frac{i-1}{i+1}$.
- 2) Compute the trigonometric form of $(1+i)$ and then compute the real and imaginary part of $(1+i)^4$.
- 3) Compute the trigonometric form of $(-3+2i)(2-i)$.
- 4) Check that $x=3$ is a root of $-4x^3 + 3x^2 + 25x + 6 = 0$. Compute all the roots.
- 5) Compute the partial fraction decomposition of:

$$\frac{3x^3 + 4x + 11}{x^2 - 3x + 2}$$

- 6) Compute the following limits:

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

$$\lim_{x \rightarrow 2} \frac{x^2 + 4x - 12}{x^2 - 2x}$$

$$\lim_{x \rightarrow -3} \frac{2x+1}{x+3}$$

$$\lim_{x \rightarrow -\infty} \frac{8x^7 - 6x^3 + 4}{-9x^5 + 12x^3 - 6x}$$

$$\lim_{x \rightarrow 0} \frac{\cos(2x) - 1}{x^3 + 5x^2}$$

- 7) Using the Laplace transform solve the following differential equation:

$$\ddot{y}(t) - 3\dot{y}(t) + 2y(t) = e^{3t}$$

with: $y(0^-) = 1$; $\dot{y}(0^-) = 0$

8) Compute the inverse Laplace transform of $F(p) = \frac{2}{p^2 + 2p + 10}$ using line (22) of the table of Laplace Transforms.