

0) Have you taken the prerequisite math courses?

1) Use complex numbers to derive the following equation:

$$\sin(2\alpha) = 2 \sin(\alpha) \cos(\alpha) . \quad (1)$$

2) What is the general solution of the following ODE?

$$x'' = kx , \quad k < 0 . \quad (2)$$

What is the general solution for $k > 0$?

3) What is $5e^{i\pi/2} \cdot 3e^{-i\pi/4}$?

4) What is $5e^{i\pi/2} + 3e^{-i\pi/4}$?

5) Solve the following indefinite integral:

$$\int \frac{1}{x} dx . \quad (3)$$

6) Solve the following integral:

$$\int_0^\pi \cos^2 \phi \sin \phi d\phi . \quad (4)$$