1) Find *all* of the roots of $\sqrt[3]{216}$.

2) Find the solutions to $z^2 - z + 5 - 5i = 0$.

3) Show that $Ae^{i(kx - \omega t + \delta)}$ is a solution to the partial differential wave equation (for a wave in a string)

$$\frac{\partial^2 y}{\partial x^2} = \frac{\mu}{F^{tens}} \frac{\partial^2 y}{\partial t^2},$$

but only if $\frac{\mu}{F^{tens}} = \frac{k^2}{\omega^2}$.

4) Consider the complex function $z(t) = z_1(t) + z_2(t) = A_1 e^{i(\omega t + \delta_1)} + A_2 e^{i(\omega t + \delta_2)}$.

(a) Using the properties of complex exponentials, show that

$$|z|^2 = A_1^2 + A_2^2 + A_1 A_2 \left(e^{i(\delta_1 - \delta_2)} + e^{i(\delta_2 - \delta_1)} \right).$$

(b) Show that your result to part (a) can also be written as $|z|^2 = A_1^2 + A_2^2 + 2A_1 A_2 \cos(\delta_2 - \delta_1)$.

5) Show that

(a) $\frac{d}{dz}\sin(z) = \cos(z)$

(b) $\frac{d}{dz}\cos(z) = -\sin(z)$

6) Show that $2\sin z_1 \cos z_2 = \sin(z_1 + z_2) + \sin(z_1 - z_2)$.