

Homework 4, Physics 142H

Due Tuesday, September 30

1) Using the identity $e^{i\theta} = \cos \theta + i \sin \theta$, show that

$$\sin 2\theta = 2 \sin \theta \cos \theta, \quad \cos 2\theta = \cos^2 \theta - \sin^2 \theta.$$

Hint: Use $e^{i2\theta} = (e^{i\theta})^2$.

2) Show that

$$\cos \theta = \frac{e^{i\theta} + e^{-i\theta}}{2}, \quad \sin \theta = \frac{e^{i\theta} - e^{-i\theta}}{2i}.$$

3) Find a solution of the equation

$$m \frac{d^2 x}{dt^2} = -kx - m\alpha \frac{d^3 x}{dt^3} + F_0 \cos \omega t.$$