ENGG1003 - Lab Week 10

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1 Introduction

Task 1: Scalar Mathematics in Scripts

Find some equation, have them solve it generate results in a matlab script.

Task 2: Projectile Motion

Write a MATLAB script which plots the path of a particle undergoing projectile motion given its initial velocity. The velocity is specified as a speed, v_0, and angle from the horizon, θ.

As the particle moves the horizontal, x, and vertical, y, displacements as a function of time, t, can be calculated as:

$$x = v_0 t \cos(\theta)$$
$$y = v_0 t \sin(\theta) - \frac{1}{2} g t^2$$

Where g is acceleration due to gravity. If we choose positive x to be "upwards" then g, in SI units, is $-9.8\ m/s^2$ Your code should declare a time vector which is long enough to plot the particle's path until it returns to $y = 0$. This is achieved by declaring t from 0 to:

$$t = \frac{2 v_0 \sin(\theta)}{g}$$

To keep the output plot reasonably smooth declare t with a few hundred to a thousand points. You may use the `linspace()` function or `start:interval:end` syntax to declare t.

Task 3: Image Scaling

Nearest neighbour scaling by a factor of 1/N'th

Task 4: Image Blur

Make each pixel the mean of itself and the 4 adjacent pixels.