Computer Lab 4 – Week 5

Part 1

Using a pen and paper (or electronic drawing tool), draw the flow chart for the following processes. Afterwards, code the same in MATLAB using conditional programming (if-else statements). Recall that conditions are either true or false, so there must be two outputs for a condition block. Repetition will loop in on itself. You need a condition to indicate when the loop will end.

- Getting ready in the morning – begin with the alarm going off and end with either go to work or go back to sleep. Include at least 2 conditions.
- Answering your phone – begin with phone rings and end with hanging use. Include at least 2 conditions.
- Answer your emails – begin with logging on and end with logging off. Include at least 1 condition and 1 repetition.

Part 2

Create a program which calculates the trajectory of a car moving in one direction. The car starts at rest, accelerates at a constant 2 m/s^2 until it reaches a maximum velocity of 40 m/s, then the program ends. The program must store the displacement, velocity and acceleration of the car in separate columns of an array using a time step of 0.1 seconds.

Tips: Start by initialising the known values at t=0 seconds. Include the relevant equations in the blocks in your structure plan (see the table below for equations). Repetition must be used to calculate the next time step based on the information calculated in the previous time step. A condition must be used for the program to terminate when the velocity reaches 40 m/s.

Formula	a	v_f	v_i	d	t
$v_f = v_i + at$	◆	◆	◆	X	◆
$d = v_i t + \frac{1}{2} at^2$	◆	X	◆	◆	◆
$d = v_f t - \frac{1}{2} at^2$	◆	◆	X	◆	◆
$v_f^2 = v_i^2 + 2ad$	◆	◆	◆	◆	X
$d = \frac{1}{2} (v_f + v_i) t$	X	◆	◆	◆	◆