Computer Lab 2 – Week 3

1   Program

The "Hello World" program is traditionally the first program written in a new programming language or
environment. However, MATLAB has a number of ways of displaying such a message to the user. Experiment with these methods:

- Using the **disp** function: **disp('Hello World!')**
- Using the msgbox function: **msgbox('Hello World!','Hello!')**
- Using helpdlg: **helpdlg('Hello World!','Help Dialog Box')**
- Using GUI: **uicontrol('Style','text','String','Hello World!');**

2   Mathematical functions

MATLAB has a very large library of mathematical functions that you can use to help you calculate the answers to numerical questions. Helpful functions include sqrt( ), sin( ) and cos( ). Use MATLAB to calculate the answers to the following problems with formulae you may have seen in mathematics class in high school.

- Find the future value (FV) of a bank account starting with $1, 000 and with interest rate of 4% per year, using the formula: $FV = PV(1 + r)^n$. What will the value be in 10 years' time?

- What is the surface area of a closed cylinder with height 30cm and radius 5cm: $SA = 2\pi r^2 + 2\pi rh$

- Calculate the distance between two points P$_1$=(3,-3) and P$_2$=(-5,3) using the formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

- Using the Law of Cosines, the third side of a triangle with sides a, b and angle between them θ, is
$c = \sqrt{a^2 + b^2 - 2ab\cos\theta}$. Find the third side of a triangle with a=3, b=10 and θ=π/4. Note that MATLAB uses radians by default.

3   MATLAB % Comments

Commenting is useful to add extra information without affecting your code. A comment must be preceded by a percentage sign %. For example:

```
a=sqrt(b^2+c^2); % calculate hypotenuse
```

Demonstrate your ability to use proper commenting by writing a short program (a sequence of steps) that performs the following tasks below.

- Set the initial values of the following variables: **radius=3, height=10, density=8**
- Calculate **area = pi * radius^2**
- Calculate **volume = area * height**
- Calculate **mass = volume * density**

What does the program calculate and is it clear from your comments?

4   Follow and implement the following in MATLAB

A phone costs $900 to buy outright. However, if you sign a two-year contract with telecommunications company A, you can get the phone for $80 a month, with $500 monthly credit. Telecommunications company B offers a bring-your-own-phone plan at $20 a month for the same amount of monthly credit. How much will you pay for each option over 2 years?

Analysis

With A: you will pay $80x24 months. With B: you will pay $900+$20*24. The same credit is given in both cases, so is irrelevant to the calculation.

MATLAB Code

```
pay_phone=900; % phone outright price
pay_time=24; % payment duration in months
pay_month_A=80; % monthly payment with company A
pay_month_B=20; % monthly payment with company B
total_A=pay_month_A*pay_time; % total payment with option A
total_B=pay_month_B*pay_time+pay_phone; % total payment with option B
```

5   To try: Short Program

Write a short program to convert from feet-and-inches to metres. Begin by requesting two inputs from the user (feet, then inches) using the **input** function. Determine and implement an equation for the conversion. Display the solution to the user using the **disp** function. Add a comment to each line.