# 300027 Engineering Computing 2016.1

## Quiz 2 Sample

| Duration: 1 hour | Weighting: 30% |
|---|---|

Name: _____ Student ID: _____

Instructions:

1. **This is an individual assignment. Students must submit their own work.**
2. Students must read UWS "Student Academic Misconduct Policy" at http://policies.uws.edu.au/view.current.php?id=00051 to understand the full definition of academic misconduct and the consequences of such behaviour.
3. Students will need to show their work before leaving the lab class.
4. All submissions are via vUWS ONLY.
5. **Only MATLAB code should be submitted**. Filename should be quiz1_studentID.m (where studentID is your actual student ID) or appropriate function filename. **It is students' responsibility to make sure that the correct file was submitted**.
6. NO late submissions will be accepted.
7. The students will be able to submit the Quiz two (2) times before the deadline – only the final submission will be marked.

**3000027 Engineering Computing 2016 Autumn**

**Sample Quiz 2** **Time Allocated 60 minutes (strictly)** **Weighting 30%**

Create a MATLAB script file called `quiz2_studentID.m` where studentID is your actual 8-digit student ID.

Add an identification block using MATLAB comments. Include the following information
% Student ID:
% Name:
% Lab Session (location and time):

Sample Problem 1:

Write a program that finds the smallest even integer that is divisible by 13 and by 16 whose square root is greater than 120. Use a loop in the program. The loop should start from 1 and stop when the number is found. The program prints the message "The required number is:" and then prints the number.

Sample Problem 2:

The x and y position of a projectile can be calculated as a function of time given an initial angle $\theta$. Write a user defined MATLAB function using the following equations:

$$v_x = 50\cos(\theta)$$
$$v_y = 50\sin(\theta)$$
$$x = v_x t$$
$$y = v_y t - \frac{1}{2}gt^2$$

(angles are in radians)

The inputs to the function are *t* and $\theta$; the outputs are *x* and *y*; and *g* = 9.8 m/s. Name the function as q2_func. Write the function such that both *t* and $\theta$ can be vectors.

(a) Use the function `q2_func` to calculate and display the value of *x* and *y* for *t=24* and $\theta = 50°$.

(b) Use the function `q2_func` to calculate and plot *x* and *y* for $0 \leq t \leq 7.8$ in steps of 0.1 and $= 50°$ . **Title** your figure with **your student ID** and use **figure window 1** to display a plot of $v_x$ vs *t* and $v_y$ vs *t* on the same figure. Label axes appropriately and add a legend.

Note: This question requires you to produce a function m-file (q2_func.m) and make calls to the user-defined function from your script file (from quiz2_studentID.m file). **No marks will be awarded if a function m-file is not produced**.

Sample Problem 3:

On **figure window 2**, plot the following functions on the same polar plot for 200 values of theta ranging from 0 to $2\pi$:

$$f_1 = \frac{\sin(\pi\cos(\theta))}{4\sin(\pi/4 + (\pi\cos(\theta))/4)}$$

$$f_2 = \frac{\sin(\pi\cos(\theta))}{4\sin((\pi\cos(\theta))/4 - \pi/4)}$$

(Angles are in radians)

Adjust the plot created above so that:

a. Line 1 is red and solid
b. Line 2 is black and dashed

Title the plot 'Problem 3 – student_ID' and add a legend.

Sample Problem 4:

Create a vector *x* with values of 0 to 20 in steps of 0.1. Given

$$y = e^{-0.2x}(\sin\left(\frac{x}{2}\right) + \frac{1}{3}\sin(x) + \frac{1}{5}\sin(2x))$$

a. Create a graph of y versus x. Use a black dot-dashed line to connect points and circles to indicate points on the graph. Label the graph appropriately, title the figure using student ID and display it on **figure window 3**.
b. Determine and display the **number** of *y* values that are greater than or equal to 0.3 ( $y \geq 0.3$).

Sample Problem 5:

Use a `for` loop to evaluate the following summation for *N*=10 and *x*=0.15.

$$S = \sum_{n=0}^{N} \frac{(-1)^n}{(2n)!} x^{2n}$$

The program should display the message "S = " and then display the result using **6 decimal places**.

Repeat the above for *N*=100 and *x*=0.15.

Note: Quiz 2 will have only 4 questions (not 5).

Upload your m-files (Quiz2_StudentID.m and function m-file) to vUWS.

**Assessment Criteria**

| Criteria | Unsatisfactory | Satisfactory | Excellent | Outstanding |
|---|---|---|---|---|
| **MATLAB script [-5 marks]** | MATLAB script file was created with help from tutor (-5 Marks) | MATLAB script file was created with the correct filename with no help from tutor (0 Marks) | | |
| **Presentation [3 Marks]** | Presentation is cluttered with intermediate results (0 Marks) | Presentation of results is clear with no intermediate results shown (3 Marks) | | |
| **Figures [3 Marks]** | Figures are not labelled appropriately or not displayed as specified (0 Marks) | Figures are labelled appropriately and displayed on figure windows as specified (3 marks) | | |
| **Using comments [4 marks]** | No comments are used to describe the code (0 Marks) | Some comments are used (2 Mark) | Meaningful comments are used to explain the code (4 Marks) | |
| | | | | |
| **Program execution [4 marks X 4 questions]** | Program does not run; the coding script contains excessive errors. **The rest of the question may not be marked in this scenario.** (0 Marks) | Program **runs** with minor warnings; the coding script may contain **minor** errors or typos. (1 Marks) | Program runs with no errors or warnings. Some intermediate results are displayed or figures are not shown on figure windows as specified. (3 Marks) | Program runs with no errors or warnings. Only requested all outputs are shown with no intermediate results. (4 Marks) |
| **Compliance with specifications [6 marks X 4 questions]** | Program runs but no or few specifications are satisfied. (0 Marks) | Most parts of the specifications are implemented. (*all figure axes are labelled where necessary*) (3 Marks) | Program satisfies all specifications, though with some minor typos which did not impact programming principles. (*all axes labelled, and titles shown where necessary*) (5 Marks) | Program satisfies specifications completely and correctly (*all axes labelled, and titles given where necessary*) (6 Marks) |

**** If the program does not run, then compliance with the specification may not be assessed.**