The University of Jordan
School of Engineering
Chemical Engineering Department

(965201) Computer Applications for Chemical Engineering **First Semester – 2020/2021**

Quiz # 2

Q1: Write a MATLAB script to:

(a) Plot the function $z(x) = \sin\left(\sqrt{x}(1+x)^{1/3}\right)$ for $0 < x < \pi$. **Label your axes.**

(b) Numerically find $\int_0^{\pi} sin\left(\sqrt{x}(1+x)^{1/3}\right).dx$ using:

1. **`trapz`** function
2. **`quad`** function (use the **`inline`** function here).

(c) Find the relative error occurred from using **`trapz`** function.

Q2: Solve the following implicit differential equation over the range $t = [0,10]$

$$y'(y^3 - 1) - t^2.y^2(y')^2 + \sqrt{y'} - t/y = 0$$

$$\text{with } y(0) = \sqrt[3]{2}, \text{ and } y'(0) = 1/\sqrt[3]{2}$$

- Write your **function**
- Write your commands to solve the differential equations
- Plot the results ***after writing down your full plotting command***.

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Q1: Write a MATLAB script to:

(a) Plot the function $z(x) = \cos\left(\sqrt{x}(1+x)^{1/3}\right)$ for $0 < x < 2\pi$. **Label your axes.**

(b) Numerically find $\int_0^{2\pi} cos\left(\sqrt{x}(1+x)^{1/3}\right).dx$ using:

1. **`trapz`** function
2. **`quad`** function (use the **`inline`** function here).

(c) Find the relative error occurred from using **`trapz`** function.

Q2: Solve the following implicit differential equation over the range $t = [0,10]$

$$y'(y^3 - 1) - t^2.y^2(y')^2 + \sqrt{yy'} - t/y = 0$$

with $y(0) = 1/\sqrt[3]{2}$, and $y'(0) = 0$

- Write your **function**
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Quiz # 2

Q1: Use the **`inline`** function and the suitable solver to solve the nonlinear equation below, and find its **three solutions** in the range of $1 < x < 10$.

$$\boldsymbol{f(x) = sin\left(\sqrt{2x}(1+x)^{1/3}\right)}$$

Q2: Solve the following set of differential equations over the range $t = [0, 1]$, and then plot your curves (y_1, y_2, *and* y_3) (always label your axes):

$$y_1' - 2y_2 + y_1^2.y_3 - 2 = 0 \qquad y_1(0) = 1$$
$$y_2' - y_2^2 + y_1.y_3 + y_3^4 + 3 = 0 \qquad y_2(0) = -1$$
$$y_3'.(y_2')^2 - 2y_3^3 - 1 = 0 \qquad y_3(0) = 0$$

- Write your **function**
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Quiz # 2

Q1: Use the **`inline`** function and the suitable solver to solve the nonlinear equation below, and find its **three solutions** in the range of $0 < x < 10$.

$$\boldsymbol{f(x) = cos\left(\sqrt{2x}(1+x)^{1/3}\right)}$$

Q2: Solve the following set of differential equations over the range $t = [0, 1]$, and then plot your curves (y_1, y_2, *and* y_3) (always label your axes):

$$y_1' - 2y_3 + y_1.y_2^2 - 2 = 0 \qquad y_1(0) = 1$$
$$y_2' - y_3^2 + y_1.y_2 + y_1^4 - 3 = 0 \qquad y_2(0) = 0$$
$$y_3'.(y_2')^2 - 2y_1^3 - 1 = 0 \qquad y_3(0) = -1$$

- Write your **function**
- Write your commands to solve the differential equations
- Plot the results ***after writing down your full plotting command***.