The University of Jordan
Faculty of Engineering & Technology
Chemical Engineering Department

8.5/10

(905201) Computer Application in Chemical Engineering — First Semester – 2015/2016

Quiz # 1 — Section: [1] [2]

Name: Rama Kamel al-drabee — ID # 0145006

1. **Which command is used to remove the all the variables in the work space?**

(a) `clear`
(b) `clc`
(c) `home`
(d) `clrcmd`

2. **Which code represents the shown formula?**

$$y = 2\frac{sin^3(t)}{(x+1)(x-1)}$$

(a) `y = 2*sin(t)^3/(x+1*x-1)`
(b) `y = 2*sin(t)^3/((x+1)*(x-1))`
(c) `y = 2(sin(t)^3/((x+1)*(x-1)))` X
(d) `y = 2*sin((t)^3)/((x+1)*(x-1))`

3. **For the formula in Q2, if x = -3 and t = 45°, what will be the value of y?** polynomial

y = 0.0884

4. **True or False?**

(a) Matlab variables cannot contain the "underscore _". can (X)
(b) If you define "Speed = 63", and recall it as "speed", it will give you "63" as well. (X)
(c) NaN is the result of the code 2/0. inf (X)
(d) Text strings can be displayed with the function "disp". (✓)

5. **Create a row vector m that represents the following polynomial, find its roots, and its derivative:** $m(x) = (x^4 + 2)(2x^2 - 5x + 3) = 2x^6 - 5x^5 + 3x^4 + 4x^2 - 10x + 6$

```
m = [2 -5 3 0 4 -10 6]

roots(m) =
  -0.8409 + 0.8409i
  -0.8409 - 0.8409i
   0.8409 + 0.8409i
   0.8409 - 0.8409i
   1.5000
   1.0000

derivative:

polyder(m) = 12 -25 +12 0 8 -10

⇒ 12x^5 - 25x^4 + 12x^3 + 0x^2 + 8x + 10
```

6. Use MATLAB to solve the following linear system:

-5

$$\begin{aligned} 5y + 8x &= 20 \\ 9x + 4y &= 14 + 3z \\ 3z &= 4y - 5 \end{aligned}$$

$$\begin{aligned} 8x + 5y + 0z &= 20 \\ 9x + 4y - 3z &= 14 \\ 0x - 4y + 3z &= -5 \end{aligned}$$

Rewrite the linear system so that it is in matrix form $Ax = b$.

What is your A?

$$\begin{bmatrix} 8 & 5 & 0 \\ 9 & 4 & -3 \\ 0 & -4 & 3 \end{bmatrix}$$

How enter your A in MATLAB?

What is your b?

$$\begin{bmatrix} 20 \\ 14 \\ -5 \end{bmatrix}$$

What is your solution for x, y, and z?

command?

x = 1.000

y = 2.4000

z = 1.5333

* Rama kamel aldrabee.

* 0145006

* Monday lab

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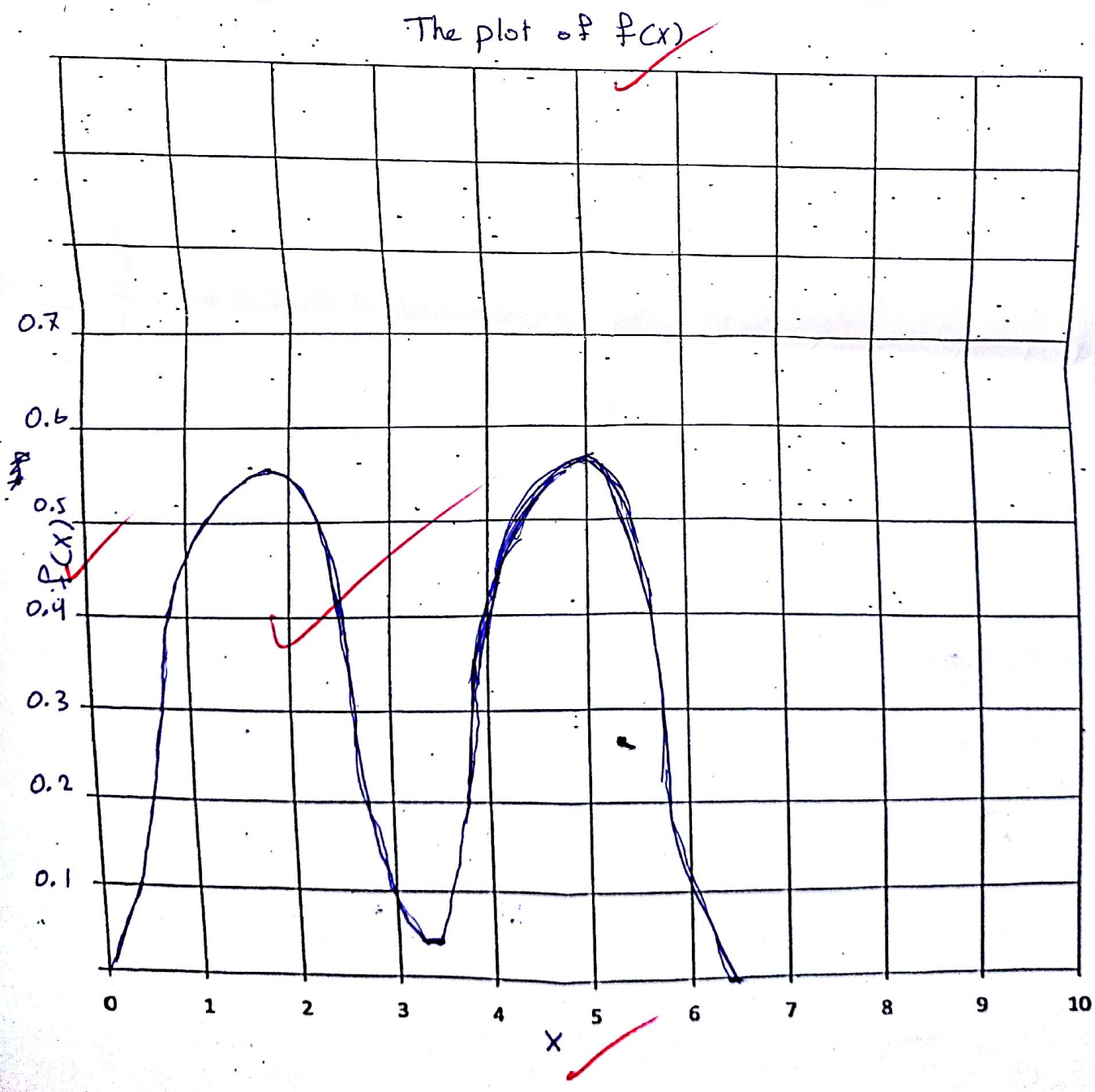
Great effort

```
X= linspace (0, 2*pi);
Y= 0.4 * (1.8 * sin(x) .^2)) .^ (1/2);
plot (x,y); grid on; xlabel ('x'); ylabel ('f(x)'); title ('The plot of f(x)')
```



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(905201) Computer Applications in Chemical Engineering — First Semester – 2015/2016

Midterm Exam — Section: [1] [2]

Name: Rama Kamel al-drabee — **ID #** 0115006

Q1: Use a **for** loop *in a script* to determine and *display* the result of multiplying all odd numbers from 3 to 30. **[7 points]**

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```
i=1
for t=[3:2:30]
    i = i*t
end
disp('theresult of multiplying')
disp(i)
```

Q2: **[7 points]** Create the variables to represent matrix as follows: $B = \begin{bmatrix} 1 & 2 & 3 \\ 5 & 8 & 3 \\ 2 & 4 & 6 \end{bmatrix}$

Now, write your MATLAB command to produce the following variables and write down your answer:

a) *Assign to the variable A1 the value of the second column of matrix B*

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```
>> A1 =
B=[1 2 3; 5 8 3; 2 4 6]
A1 = B(:,2)
A1 =
   2
   8
   4
```

b) *Assign to the variable A2 the value of the third raw of matrix B*

```
>> A2 =
A2 = B(3,:)
A2 =
   2   4   6
```

c) Multiply A1 by the **transpose** of A2, element by element, and write down the answer

```
>> a1 = [200; 800; 400];
a2 = [000; 000; 246];
a1 .* a2' =
   0   0   0
   0   0   0
   8   0   0
```

Q3: **[9 points]** A discharge factor is a ratio which compares the mass flow rate at the end of a channel to an ideal channel. The discharge factor for flow through an open channel of parabolic cross-section is:

$$K = \frac{1.2}{x}\left[\sqrt{16x^2+1} + \frac{1}{4x} ln\left(\sqrt{16x^2+1} + 4x\right)\right]^{-\frac{2}{3}}$$

where x is the ratio of the maximum water depth to breadth of the channel at the top of the water.

Write your MATLAB function to determine and plot the discharge factors for x, entered by the user, in the range (0.45 to 0.90) in steps of (0.05), then run it and plot your (K vs. x) graph on the provided graph. Write the full plotting code, including your axes labeling.

```
% k is a discharge factor
% is a ratio which compares the mass flow rate.
function K
   k = (1.2/X) * ((16* X^2 +1) .^ (1/2)) + 1/(4*X) *(log (16*X^2+1+4*X)) ^ (2/3)
end
X= [0.45 : 0.05: 0.90]
plot (X, k), grid on , Xlabel ('the values of x'), ylabel ('k'), title ('k vs X')
in command window to run this function.
X= input ('the value of x = ')
the value of x = 3
S = k(3) => 4.8449
```