

MATLAB Assessment - Jake Richards

by Jake Richards

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University of Wales Trinity Saint David

MATLAB

Assessment 2026

L4 - Mathematics (ACDB4003)

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Question 1

If $x = 2.0$ and $y = 3.0$

use Matlab to evaluate: -

(i) $3x^2 - 2y^3$

```
>> y=3.0  
y =  
    3  
>> x = 2.0  
x =  
    2  
>> 3*x^2-2*y^3  
ans =  
   -42
```

(ii) $\ln(x*y)$

```
>> y = 3.0  
y =  
    3  
>> x = 2.0  
x =  
    2  
>> log(x*y)  
ans =  
    1.7918
```

(iii) $\sqrt{x/y}$

```
>> y = 3.0  
y =  
    3  
>> x = 2.0  
x =  
    2  
>> sqrt(x/y)  
ans =  
    0.8165
```

(iv)

e^y

```
>> y = 3.0
y =
    3
>> x = 2.0
x =
    2
>> exp(y)
ans =
    20.0855
```

(v)

$e^{-x} + \log(y)$

```
>> y = 3.0
y =
    3
>> x = 2.0
x =
    2
>> exp(-x)+log10(y)
ans =
    0.6125
```

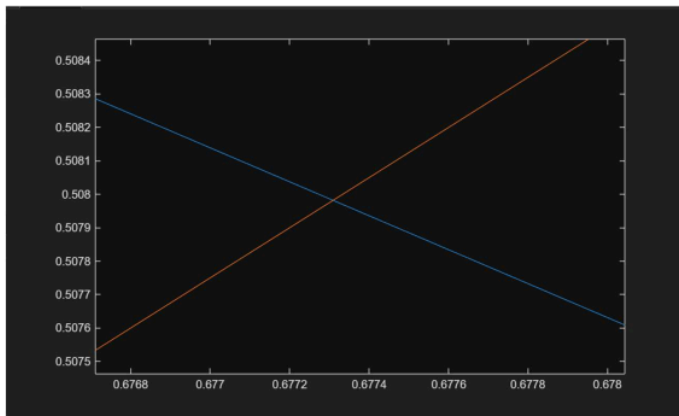
Question 2

Draw the graphs, in the same window, of

$$y = e^{-x}$$

$$y = 0.75x$$

from $x = 0$ to $x = 4$



$$X = 0.677$$

$$Y = 0.508$$

Question 3

Use **solve** to find all roots of the equation

$$X^3 - 6X^2 + 11X - 6 = 0$$

```
>> syms x
>>
>> solve(x^3-6*x^2-11*x-6)

ans =

root(z^3 - 6*z^2 - 11*z - 6, z, 1)
root(z^3 - 6*z^2 - 11*z - 6, z, 2)
root(z^3 - 6*z^2 - 11*z - 6, z, 3)
```

Question 4

Find the gradient m and constant c in the equation of the straight line which is a least squares approximation to the data given in following table.

x	1.0	2.0	3.0	4.0	5.0	6.0
y	4.1	6.7	9.9	13.3	16.4	19.3

Estimate the value of y at $x = 4.5$

```
>> x = [1.0 2.0 3.0 4.0 5.0 6.0]
x =
     1     2     3     4     5     6
>> y = [4.1 6.7 9.9 13.3 16.4 19.3]
y =
     4.1000     6.7000     9.9000    13.3000    16.4000    19.3000
>> P = polyfit(x,y,1)
P =
     3.1000     0.7667
>> y1 = polyval(P,4.5)
y1 =
    14.7167
>> |
```

Question 5

Find the second derivative of

$$y = \sin(6x)$$

Show that y satisfies the equation

$$d^2y/dx^2 + 36y = 0$$

```
>> syms x
>> y = sin(6*x)

y =

sin(6*x)

>> y2 = diff(y,2)

y2 =

-36*sin(6*x)

>> y2+36*y

ans =

0
```

Question 6

For the two vectors $\mathbf{a} = (2, -2, 3)$ and $\mathbf{b} = (2, -3, 2)$ find:-

- The dot product of $\mathbf{a}$ and $\mathbf{b}$ and
- The cross product of $\mathbf{a}$ with $\mathbf{b}$.

```
>> a = [2 -2 3]
a =
     2     -2     3
>> b = [2 -3 2]
b =
     2     -3     2
>> dot(a,b)
ans =
    16
>> cross(a,b)
ans =
     5     2    -2
```

Question 7

(i) Find the determinant $|A|$ and (ii) A^{-1} the inverse of matrix A

$$A = \begin{pmatrix} 1 & 1 & 2 \\ 1 & 2 & 1 \\ 3 & -1 & -1 \end{pmatrix}$$

```
>> A = [1 1 2 ; 1 2 1; 3 -1 -1]

A =

     1     1     2
     1     2     1
     3    -1    -1

>> det(A)

ans =

    -11.0000

>> inv(A)

ans =

    0.0909    0.0909    0.2727
   -0.3636    0.6364   -0.0909
    0.6364   -0.3636   -0.0909
```

Question 8

The following simultaneous equations are represented by the matrix equation $\mathbf{AX} = \mathbf{B}$, where $\mathbf{A}$ is the matrix of question 7, $\mathbf{X} = [x \ y \ z]^T$ and $\mathbf{B} = [4, 4, 1]^T$

$$x + y + 2z = 4$$

$$x + 2y + 1z = 4$$

$$3x - 1y - 1z = 1$$

Use Matlab to solve for x, y and z by using the following matrix equation.

$$\mathbf{X} = \mathbf{A}^{-1} \mathbf{B}^T$$

```
>> B = [4 ; 4; 1]

B =

     4
     4
     1

>> S = inv(A)*B

S =

    1.0000
    1.0000
    1.0000
```

MATLAB Assessment - Jake Richards

GRADEMARK REPORT

FINAL GRADE

GENERAL COMMENTS

88/100

Matlab Assessment Feedback

-

Q1 Evaluating functional expressions [10 marks]

All expressions evaluated correctly , but you don't need to enter x and y values each time, unless you use clear all which you haven't.

[9 marks]

Q2 Plotting graphs and solving non-linear simultaneous equations [12 marks]

Needed to see the 'fplot' or plot commands here and also each graph with perhaps a key or text to illustrate. The zoom function used correctly to find point of intersection though.[6 marks]

Q3 Solving cubic equations [8 marks]

Ok but better to have used the solve function to just provide the answers of 1,2 and 3 and assign these to a variable , $x_1 = \text{ans}(1)$ etc.

[6 marks]

Q4 Least Squares line of best fit through a data set, and interpolating a value [12 marks]

All correct [12 marks]

Q5 Showing a function is a solution to a differential equation [10 marks]

All correct [10 marks]

Q6 Finding the dot and cross product of vectors in 3D [10 marks]

All correct [10 marks]

Q7 Finding the determinant and the inverse of a 3 x 3 matrix [10 marks]

All correct [10 marks]

Q8 Solving a 3x3 system of simultaneous linear equations [12 marks]

Again would have been good to assign the solutions to the appropriate variable here, i.e. $x = \text{ans}(1)$, $y = \text{ans}(2)$ etc..

[11 marks]

Total 74/84 = 88 %

This is a good effort Jake, showing that you have a good grasp of the fundamentals of MATLAB. This will help you in your future studies. Good effort, well done!

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