

Maths A1

by Sarah Ismail

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MATHEMATICS

ACDB4003

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Question 1A

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

```
>> x = 2.0;
```

```
y = 3.0;
```

```
>> 3*x^2 - 2*y^3
```

```
ans =
```

```
-42
```

```
>>
```

Working out:

$$3(2)^2 - 2(3)^3 = 3(4) - 2(27) = 12 - 54 = -42$$

Question 1B

```
>> log(x*y)
```

```
ans =
```

```
1.7918
```

```
>> log(x*y)
```

```
ans =
```

```
1.7918
```

Working out:

$$\ln(2 \times 3) = \ln(6) = 1.7918$$

Question 1C

```
>> sqrt(x/y)
```

```
ans =
```

```
0.8165
```

```
>> sqrt(x/y)
```

```
ans =
```

```
0.8165
```

Working out:

$$\sqrt{32} = 0.8165$$

Question 1D

```
>> exp(y)
```

```
ans =
```

```
20.0855
```

```
>> exp(-x) + log10(y)
```

```
ans =
```

```
0.6125
```

```
>> exp(y)
```

```
ans =
```

```
20.0855
```

Working out: $e^3=20.0855$

```
>> exp(-x) + log10(y)
```

```
ans =
```

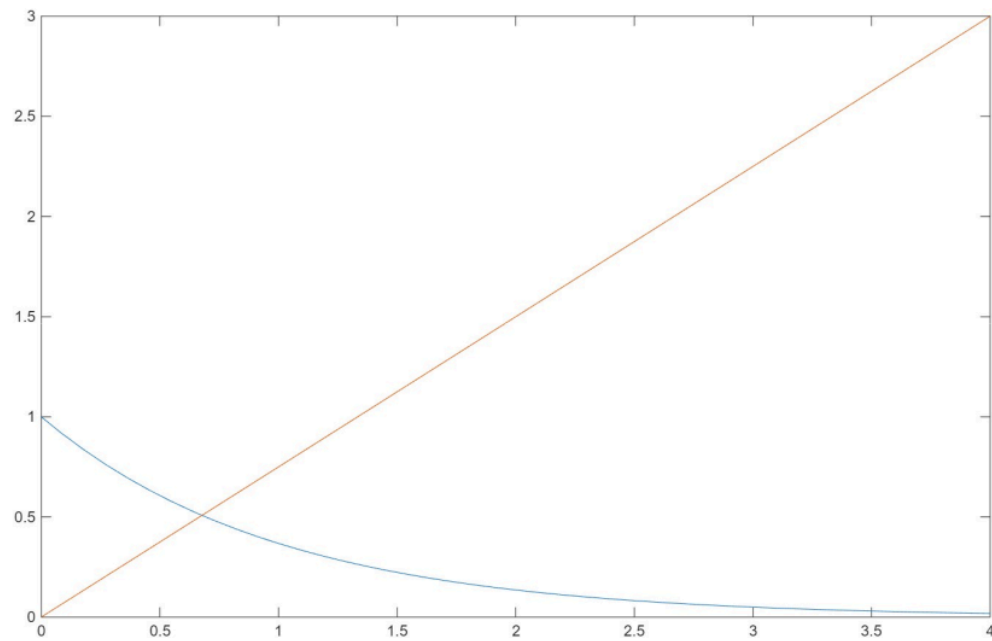
```
0.6125
```

```
>>
```

Working out:

$e^{-2}+\log_{10}(3)=0.1353+0.4771=0.6124$

Question 2

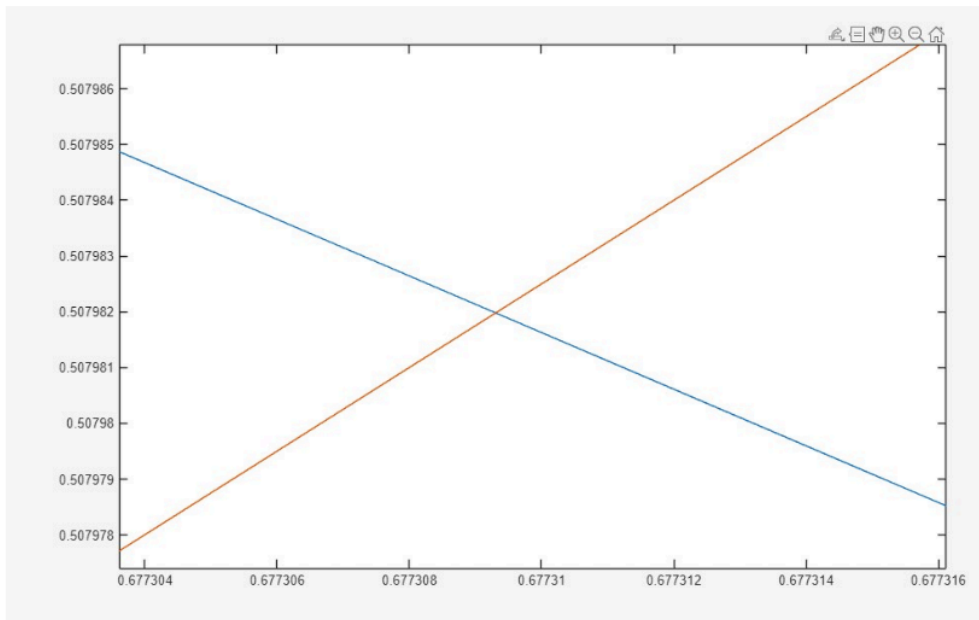


```
>> fplot('exp(-x)', [0,4])
hold on
fplot('0.75*x', [0,4])
Warning: fplot will not accept character vectors
> In fplot (line 125)
Warning: fplot will not accept character vectors
> In fplot (line 125)
>> |
```

```
>> fplot('exp(-x)', [0,4])
```

```
hold on
```

```
fplot('0.75*x', [0,4])
```



Here we plot both functions on the same graph and then find the point where they intersect.

Question 3:

```
>> clear all
>> syms x
solve(x^3 - 6*x^2 + 11*x - 6 == 0)

ans =

1
2
3

>> |
```

MatLab Code:

```
>> clear all

>> syms x

solve(x^3 - 6*x^2 + 11*x - 6 == 0)

ans =

1
2
3

>>
```

Question 4:

```
>> clear all
>> 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];
p = polyfit(x,y,1)
y1 = polyval(p,4.5)

p =

    3.1000    0.7667

y1 =

    14.7167

>> |
```

MatLab Code:

```
>> clear all
```

```
>> 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];
```

```
p = polyfit(x,y,1)
```

```
y1 = polyval(p,4.5)
```

p =

```
3.1000  0.7667
```

y1 =

```
14.7167
```

```
>>
```

Question 5

```
>> clear all
>> syms x
y = sin(6*x)
diff(y,2)

y =

sin(6*x)

ans =

-36*sin(6*x)

>> diff(y,2) + 36*y

ans =

0

>> |
```

MatLab code:

```
>> clear all

>> syms x

y = sin(6*x)

diff(y,2)

y =

sin(6*x)

ans =
```

$-36\sin(6x)$

```
>> diff(y,2) + 36*y
```

ans =

0

```
>>
```

Question 6

```
>> clear all
>> a = [2 -2 3]
b = [2 -3 2]
dot(a,b)
cross(a,b)

a =

     2     -2     3

b =

     2     -3     2

ans =

    16

ans =

     5     2    -2

>> |
```

MatLab Code:

```
>> clear all
```

```
>> a = [2 -2 3]
```

```
b = [2 -3 2]
```

```
dot(a,b)
```

```
cross(a,b)
```

```
a =
```

$$\begin{pmatrix} 2 \\ -2 \\ 3 \end{pmatrix}$$

b =

$$\begin{pmatrix} 2 \\ -3 \\ 2 \end{pmatrix}$$

ans =

$$16$$

ans =

$$\begin{pmatrix} 5 \\ 2 \\ -2 \end{pmatrix}$$

>>

The dot product is:

$$a \cdot b = 16$$

The cross product is:

$$a \times b = (5, 2, -2)$$

Question 7

```
>> clear all
A = [1 1 2; 1 2 1; 3 -1 -1]
det(A)
inv(A)

A =

     1     1     2
     1     2     1
     3    -1    -1

ans =

-11.0000

ans =

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

>> |
```

MatLab Code:

```
clear all
```

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

```
det(A)
```

```
inv(A)
```

Question 8

```
>> clear all  
>> A = [1 1 2; 1 2 1; 3 -1 -1];  
B = [4; 4; 1];  
X = inv(A)*B
```

X =

1.0000

1.0000

1.0000

Matlab Code:

```
>> clear all
```

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

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

```
X = inv(A)*B
```

X =

1.0000

1.0000

1.0000

```
>>
```

FINAL GRADE

GENERAL COMMENTS

93/100

Matlab Assessment Feedback

-

Q1 Evaluating functional expressions [10 marks]

All expressions evaluated correctly and good use of checking correct solutions provided also.

[10 marks]

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

A key would have been useful here to differentiate the graphs and also the zoom function needed to be used to provide the solution to 3d.p's.

[9 marks]

Q3 Solving cubic equations [8 marks]

No need to use `=` here as solve function works out the solution for you. It would have been good to also assign variable to the solutions ie $x_1 = 1$, $x_2 = 2$ 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]

All correct [10 marks]

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

All correct [10 marks]

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

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

[11 marks]

Total 78/84 =93 %

This is a good effort Sarah showing you have grasped the fundamentals of MATLAB which will help you in your further studies as you progress. Well Done!

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