

RMIT University

**OENG-1116: MODELLING & SIMUALTION
OF ENGINEERING SYSTEMS**

**Assignment-1:
MATLAB in Practical Applications**

Tutorial-2 (Wk-5)

BASIC INFORMATION ON ASSIGNMENT-1 (Pt1): Submission via Google Forms (NO CANVAS)

A1: INDIVIDUAL ASSIGNMENT

- The web links to your Individual Assignments have been sent to you to your Student email boxes.
- Please, report immediately to Prof P.M.Trivailo via email, IF you did not receive web links to your Assignment-1.
- This Tutorial will consider a MOCK-UP of the A1 with a set of problems, similar to what you have in your Assignments, however it IS NOT your Assignment. Please, use it as a training ground.
- There is NO allocation of any points to the MOCK-UP, therefore, you can submit it as many times, as you wish.

A1-Pt1 MOCK-UP WEB LINK:

<https://docs.google.com/forms/d/e/1FAIpQLSe6pGqB0TVWsO3EmfrAXOd46yv3sEBvAYYaHNlt4-crU0KG8g/viewform>



Important:

TO ACCESS A1-Pt1 via this link,

YOU MUST BE LOGGED IN

INTO YOUR

RMIT STUDENT ACCOUNT,

something like

s1234567@student.rmit.edu.au

In this case NO PERMISSION

Is needed to access A1.

Access from **Private Google**

(like itsme@gmail.com)

Or non-RMIT accounts

**WILL NOT WORK! as system may not
recognise your association with RMIT,
based on your email address**



OENG1116 Assignment-1-2020: Pt-1 of 2

(1) This is a Part-1 of the Individual Assignment-1 and is due on Tuesday, 07 April, 2020 (Week-6) 23:59pm Melbourne time. Submit electronically. There is NO NEED to submit or re-submit your assignment via Canvas.

(2) Total weighting of the Assignment-1 is 35% (the max TOTAL score in the Course), which includes 20% for this Part-1 of the Assignment. Attempt ALL tasks. Each Question shows its associated points.

(3) You can only assume successful submission, if you (immediately after submission) see a confirmation message from Google. Save and keep it as a proof.

(4) Message from Google must contain "edit your response" linked line. Keep this message, as the "edit" line enables you to edit your initial submission up to the due date.

(5) This Assignment is employing the most modern Google technology, enabling your mark to be "delivered" to your "doorstep", via your individual emails, which is different from traditional Canvas method, requiring you to LOG IN into your account and click many buttons to see your result. So, Canvas is not used as the main 'marks delivery vehicle'. Saying this, I will still upload your marks to Canvas, but towards the end of the Course.

(6) Important: the multiple-choice tasks may have SEVERAL CORRECT ANSWERS and, if this is the case, in order to earn question points, you need to tick ALL correct answers and, at the same time, do not tick ANY incorrect answer. Partially selected correct answers will result in zero mark for the question

Your email address (pavel.trivailo@rmit.edu.au) will be recorded when you submit this form. Not you? [Switch account](#)

*Required

A1: IMPORTANT REMARKS

1. This is a Part-1 of the Individual Assignment-1 and is **due on Tuesday, 07 April, 2020 (Week-6) 23:59pm Melbourne time.** Submit electronically. **There is NO NEED to submit or re-submit your assignment via Canvas.**
2. Total weighting of the Assignment-1 is 35% (the max TOTAL score in the Course), which includes **20% for this Part-1** of the Assignment. **Attempt ALL tasks.** Each Question shows its associated points.
3. You can only assume successful submission, if you (immediately after submission) see a **confirmation message from Google.** Save and keep it (or screen-shot) as a proof.
4. Message from Google must contain "**edit your response**" linked line. Keep this message, as the "edit" line enables you to edit your initial submission **up to the due date.**

A1: IMPORTANT REMARKS (Cont'd)

4. This Assignment is employing the most modern Google technology, enabling your **mark to be "delivered" to your "doorstep", via your individual emails**, which is different from traditional Canvas method, requiring you to LOG IN into your account and click many buttons to see your result. So, Canvas is not used as the main "marks delivery vehicle". Saying this, I will still upload your marks to Canvas, but towards the end of the Course.

5. Important: the **list-choice tasks may have SEVERAL CORRECT ANSWERS** and, if this is the case, in order to earn question points, **you need to tick ALL correct answers and, at the same time, do not tick ANY incorrect answer**. Partially selected correct answers will result in zero mark for the question.

A1: IMPORTANT REMARKS (Cont'd)

Submit your A1-Pt1 from your account!!!
And carefully check correctness of your
selected name on the Google Form!!!
They (email address and name) should match.

In case email address and name will not match,
results for the email and name involved will
not be counted and zero mark will be entered.

MOCK-UP: FILL IN AT RANDOM

Important:

In order to understand,
how the Google Form platform for A1
works,

you may wish to answer mock-up
Questions firstly *at random*.

This can be useful:

- to understand the general process,
- to understand MCQ (with one answer allowed)
- to understand list questions (with multiple answers allowed)
- to understand submission process
- to appreciate the “edit” feature

Figure-2: The equation of the given function $y(x)$.

$$y(t) = e^{-0.3t} \sin(4t)$$

PLEASE, ENTER YOUR ANSWER for TASK-2 BELOW: *

2 points

- 57
- 71
- 93
- 104
- 111
- None of the above.

MOCK-UP: FILL IN AT RANDOM

Important:

In order to understand,
how the Google Form platform for A1
works,

you may wish to answer mock-up
Questions firstly *at random*.

This can be useful:

- to understand the general process,
- to understand MCQ (with one answer allowed)
- to understand list questions (with multiple answers allowed)
- to understand submission process
- to appreciate the “edit” feature

Command Window

New to MATLAB? See resources for [Getting Started](#).

```
>> A = ones(3,4) + eye(3,4)
```

PLEASE, READ ADDITIONAL RECOMMENDATIONS AND ENTER YOUR ANSWERS for TASK-1 BELOW: *

2 points

Important: task may have several correct answers and if this is the case, in order to earn points, you need to tick ALL correct answers and at the same time do not tick any incorrect answer.

- The value of $A(:,3)$ is 1
- $A(6)$ is equal to 1
- $A+1116*i$ gives an error
- A is equal to its transpose (i.e. A')
- $A(\text{end},\text{end})$ is equal to 1
- $\text{size}(A,2)$ is equal to 2

MOCK-UP: FILL IN AT RANDOM

Important:

In order to understand,
how the Google Form platform for A1
works,

you may wish to answer mock-up
Questions firstly *at random*.

This can be useful:

- to understand the general process,
- to understand MCQ (with one answer allowed)
- to understand list questions (with multiple answers allowed)
- to understand submission process
- to appreciate the “edit” feature

PLEASE, READ ADDITIONAL RECOMMENDATIONS AND ENTER YOUR ANSWER for TASK-10 BELOW: *

2 points

Round your result up to the whole (integer) value and select the choice (in the multiple choice answer fields below), most closely matching your numerical answer.

Note: Your correct answer may be discounted if you do not submit a properly working MATLAB script, producing correct answer.

- 173 m
- 2939 m
- 17 m
- 7 m
- None of the above

SUBMIT YOUR MATLAB SCRIPT FOR Task-10 AS ONE (SINGLE) FILE INTO THE WINDOW BELOW, using 'cut-and-paste' method, cutting the script from your *.M file. The first line should have: double percentage, space, and your student number with 's', similar to the pattern '% s3456789' *

(In case you were not able to complete the script, enter a line with your student number, similar to the pattern: % s3456789 Task NOT COMPLETED)

%%

A copy of your responses will be emailed to pavel.trivailo@rmit.edu.au.

Submit

MOCK-UP: FILL IN AT RANDOM



IF ALL GOOD,
press
SUBMIT

Submit response?

Your username (pavel.trivailo@rmit.edu.au) and responses will be recorded when you submit this form.

SWITCH ACCOUNTS

SUBMIT

Your email address and your name
MUST MATCH!!!

SELECT YOUR NAME FROM THE LIST BELOW:

Important:

- (1) Students are listed alphabetically, with SURNAME shown FIRST; so, click on the black triangle and start typing your SURNAME and the system will bring you to the right place in the long class list.
- (2) Submit only your own Assignment and never register someone's Assignment, acting as a proxy! If this simple rule is not followed, email addresses/student numbers/names/assignments would be mixed up! Penalties may be applied to the offenders.
- (3) Your mark will be attributed to the email address (your assignment is sent from), providing that it matches name you select from the list. In case you are using your friend's computer, please, LOG IN as yourself and make sure that your email is displayed at the beginning of this Form!!!

*

PRESS ON TRIANGLE & START TYPING YOUR SURNAME:

Trivailo,Pavel

SUBMIT: CONFIRMATION/EDIT

Important:

After pressing SUBMIT,
**YOU SHOULD SEE
CONFIRMATION MESSAGE,**
which you are asked to save.

**In case of MOCK-UP, you can
also click “View score”
to instantly see your marks.**

**In case your real A1 your scores
Will be send via individual emails
AFTER THE DUE DATE.**

**IF you submit your real A1
BEFORE the DUE date,
you will be able to edit your
Response using
“Edit your response” up to DUE.**

OENG1116 Assignment-1-2020: Pt-1 of 2

Your OENG1116-A1-Part1 response has been recorded.

Please, save this page, as you can click on the "Edit your response" line (below) to edit your input, if necessary. With this feature I programmed for you, you can gradually build your answers for the assignment, i.e. you are not obliged to enter all answers in one go.

Note: this "Edit" feature is available only UP TO THE SUBMISSION DATE/TIME for the Assignment, however, will be switched OFF after the due date/time, so editing of the input would not be possible after the due date.

Thank you!
Prof P.M.Trivailo, OENG1116 Course Coordinator

[View score](#)

[Edit your response](#)

SUBMIT: CONFIRMATION EMAIL

Important:

After pressing SUBMIT,
**YOU SHOULD ALSO RECEIVE
CONFIRMATION EMAIL,**
which you are asked to save.

In case of MOCK-UP, you can
also click “View score”
to instantly see your marks.

In case your real A1 your scores
Will be send via individual emails
AFTER THE DUE DATE.

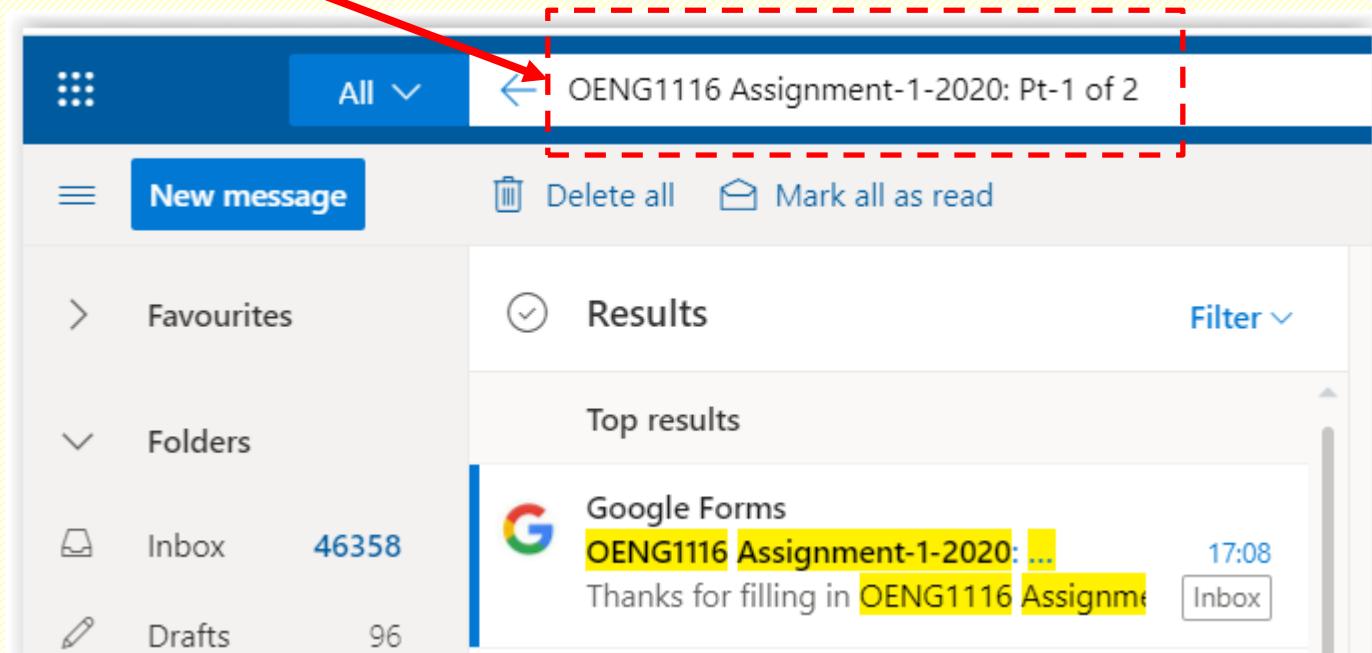
IF you submit your real A1
BEFORE the DUE date,
you will be able to edit your
Response using
“Edit your response” up to DUE.

The screenshot shows a Google Forms interface. At the top, a red box highlights the title "OENG1116 Assignment-1-2020: Pt-1 of 2". Below it, the Google Forms logo, the date "Sun 29/03/2020 17:08", and the name "Pavel Trivailo" are visible. To the right, there are navigation icons. The main content area has a yellow header "Google Forms". It displays a message: "Thanks for filling in [OENG1116 Assignment-1-2020: Pt-1 of 2](#)". Below this, a box contains "View score" and "Edit response" buttons. A purple arrow points from the bottom-left text about editing responses to this "Edit response" button. Further down, another box contains the assignment details: "(1) This is a Part-1 of the Individual Assignment-1 and is due on Tuesday, 07 April, 2020 (Week-6) 23:59pm Melbourne time. Submit electronically. There is NO NEED to submit or re-submit your assignment via Canvas.", "(2) Total weighting of the Assignment-1 is 35% (the max TOTAL score in the Course), which includes 20% for this Part-1 of the Assignment. Attempt ALL tasks. Each Question shows its associated points.", "(3) You can only assume successful submission, if you (immediately after submission) see a confirmation message from Google. Save and keep it as a proof.", and "(4) Message from Google must contain "edit your response" linked line. Keep this message, as the "edit" line enables you to edit your initial submission up to the due date."

FIND: CONFIRMATION EMAIL

Important:

IN CASE YOU MISPLACED YOUR
CONFIRMATION EMAIL,
you can search in Outlook
For “Google Forms” or
“OENG1116 Assignment-1-2020: Pt-1 of 2”.



SCORE: TOTAL SCORE



OENG1116 Assignment-1-2020: Pt-1 of 2

Total points 2/20 ?

TOTAL SCORE IS DISPLAYED HERE:

Of course, it is quite **LOW** in this example: 2 only out of 20!

However, *for the demonstration purpose only*,
we selected answers at random,
and it is unreasonable to expect
high mark with this strategy.

With careful work on the assignment, you aim to get total 20 out of 20.

SCORE: SECTIONS & DETAILS

1. TASK ITESLF with ILLUSTRATION FIGURE

TASK-1 (Basic matrix operations with MATLAB)

Consider matrix A generated by the following expression:

$A = \text{ones}(3,4) + \text{eye}(3,4)$.

Which of the following is true?

Figure-1: Entering your given matrix A via MATLAB's Command Window.

Command Window

New to MATLAB? See resources for [Getting Started](#).

```
>> A = ones(3,4) + eye(3,4)
```

Feedback

Please, repeat basic matrix operations, using MATLAB. This is a very important topic, and without its understanding you can not successfully progress in the Course. Thank you!
P.Trivailo

<https://au.mathworks.com...>

<https://au.mathworks.com...>

<https://au.mathworks.com...>

<https://legacy.essie.ufl.ed...>

<https://www.maths.unsw...>

<https://youtu.be/83S48Fs...>

<http://teaching.csse.uwa.e...>

4. INDIVIDUAL FEEDBACK & SUGGESTED REFERENCES

2. ANNOTATED SELECTED ANSWERS

X PLEASE, READ ADDITIONAL RECOMMENDATIONS AND ENTER YOUR ANSWERS for TASK-1 BELOW: *

0/2

Important: task may have several correct answers and if this is the case, in order to earn points, you need to tick ALL correct answers and at the same time do not tick any incorrect answer.

The value of $A(:,3)$ is 1

WRONG!

$A(6)$ is equal to 1

CORRECT!



$A+1116*i$ gives an error

A is equal to its transpose (i.e. A')

$A(\text{end},\text{end})$ is equal to 1

$\text{size}(A,2)$ is equal to 2

Correct answer

$A(6)$ is equal to 1

$A(\text{end},\text{end})$ is equal to 1

3. CORRECT ANSWERS

FIELDS ARE ILLUSTRATED FOR Q1.
OTHER QUESTIONS
MAY HAVE SIMILAR STRUCTURE.

FEEDBACK: Example of Reference

WEB

The screenshot shows a web browser window with the URL au.mathworks.com/help/matlab/math/basic-matrix-operations.html. The page is titled "Basic Matrix Operations". A red dashed arrow points from the "Feedback" section of the slide to the "Feedback" section on the right side of the page. A yellow box highlights the "Feedback" section on the slide.

Feedback

Please, repeat basic matrix operations, using MATLAB. This is a very important topic, and without its understanding you can not successfully progress in the Course. Thank you!
P.Trivailo

<https://au.mathworks.com...> <https://au.mathworks.com...>

<https://au.mathworks.com...> <https://legacy.essie.ufl.ed...>

<https://www.maths.unsw....> <https://youtu.be/83S48Fs...>

<http://teaching.csse.uwa.e...>

Basic Matrix Operations

This example shows basic techniques and functions for working with matrices in the MATLAB® language.

First, let's create a simple vector with 9 elements called `a`.

```
a = [1 2 3 4 6 4 3 4 5]
```

```
a = 1x9
```

```
1 2 3 4 6 4 3 4 5
```

Now let's add 2 to each element of our vector, `a`, and store the result in a new vector.

Notice how MATLAB requires no special handling of vector or matrix math.

```
b = a + 2
```

```
b = 1x9
```

```
3 4 5 6 8 6 5 6 7
```

Creating graphs in MATLAB is as easy as one command. Let's plot the result of our vector addition with grid lines.

```
plot(b)
```

```
grid on
```

FEEDBACK: Example of Reference

PAPER

Feedback

Please, repeat basic matrix operations, using MATLAB. This is a very important skill, without its understanding you can not successfully progress in the course.

P.Trivailo

<https://au.mathworks.com...> <https://au.mathwork...>

<https://au.mathworks.com...> <https://legacy.essie.ufl.ed...>

<https://www.maths.unsw....> <https://youtu.be/83S48Fs...>

<http://teaching.csse.uwa.e...>

CGN 3421 - Computer Methods Gurley

Lecture 2 MATLAB basics and Matrix Operations

Common tools: % and ;

- % indicates a comment, not a command to be executed MATLAB ignores comments. % can be placed at the end of an executable line to comment on that line

```
>> weight=input('give weight'); %getting weight
```

- a ; following an assignment will suppress display of the command result. ; signals the end of a single command, and can be used to separate multiple sequential statements on the same line.

```
>> density = 1.25; diameter = 10.2;
```

Operators

- + Addition
- Subtraction
- * Multiplication
- / Division
- ^ Power
- ' Complex conjugate transpose (swaps columns and rows)
- () Specify evaluation order

Order of Operations

FEEDBACK: Example of Reference

YouTube

Feedback

Please, repeat basic matrix operations, using MATLAB. This is a very important exercise, without its understanding you can not successfully progress in the P.Trivailo

<https://au.mathworks.com...>

<http://au.mathwor...>

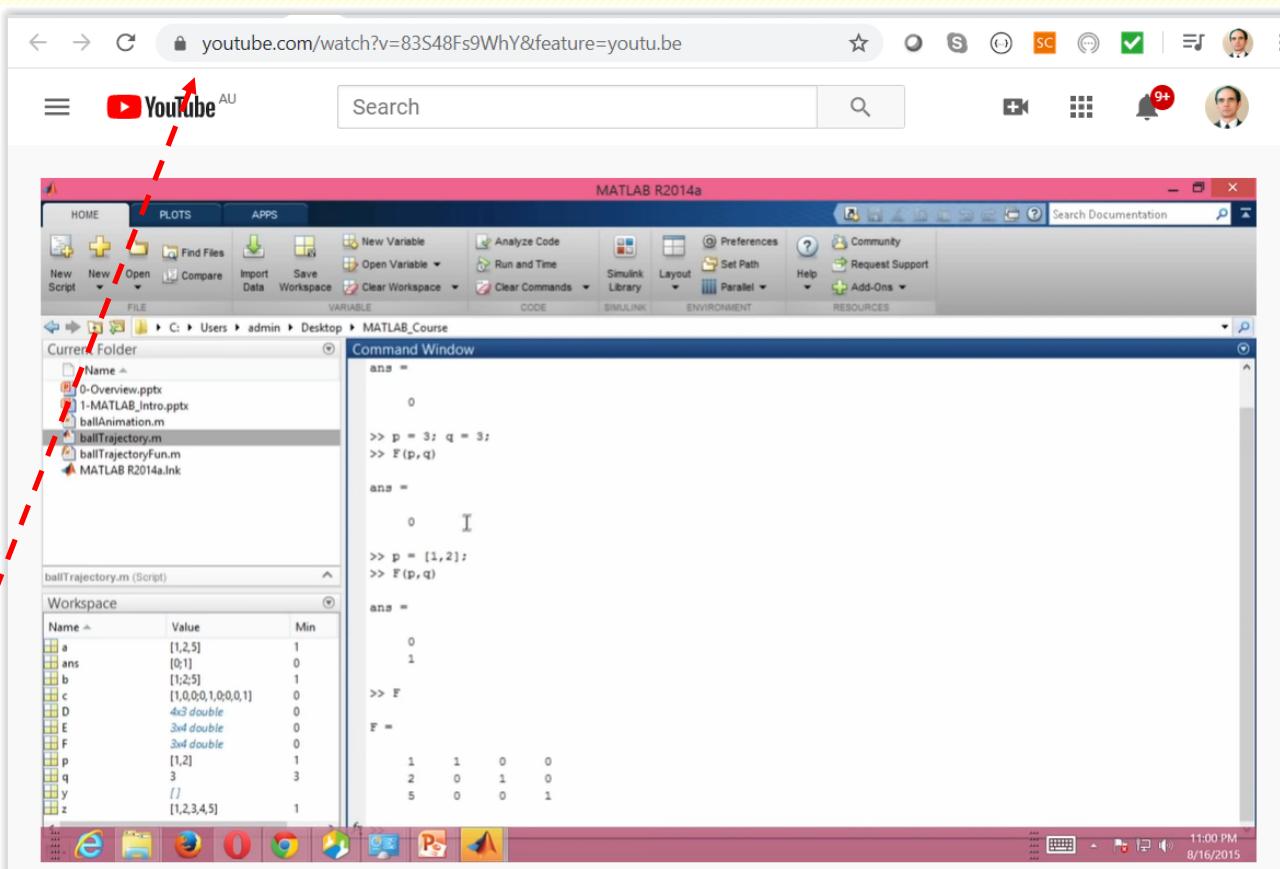
<https://au.mathworks.com...>

<https://legacy.essie...>

<https://www.maths.unsw....>

<https://youtu.be/83S48Fs...>

<http://teaching.csse.uwa.e...>



Array Operations in MATLAB

204,047 views • Dec 18, 2015

930

35

SHARE

SAVE

...

SOLVING MOCK-UP QUESTIONS: Q1

1. TASK ITESLF with ILLUSTRATION FIGURE

TASK-1 (Basic matrix operations with MATLAB)

Consider matrix A generated by the following expression:

$A = \text{ones}(3,4) + \text{eye}(3,4)$.

Which of the following is true?

Figure-1: Entering your given matrix A via MATLAB's Command Window.

Command Window

New to MATLAB? See resources for [Getting Started](#).

```
>> A = ones(3,4) + eye(3,4)
```

3. INSPECTING OPTIONS: ONE-BY-ONE

PLEASE, READ ADDITIONAL RECOMMENDATIONS AND ENTER YOUR

2 points

ANSWERS for TASK-1 BELOW: *

Important: task may have several correct answers and if this is the case, in order to earn points, you need to tick ALL correct answers and at the same time do not tick any incorrect answer.

- The value of $A(:,3)$ is 1
- $A(6)$ is equal to 1
- $A+1116i$ gives an error
- A is equal to its transpose (i.e. A')
- $A(\text{end},\text{end})$ is equal to 1
- $\text{size}(A,2)$ is equal to 2

2. ENTERING "A" in Command Window

Command Window

New to MATLAB? See resources for [Getting Started](#).

```
>> A = ones(3,4) + eye(3,4)
```

A =

2	1	1	1
1	2	1	1
1	1	2	1

4. CHECKING FIRST OPTION ANSWER:

```
>> A(:,3)
```

ans =

1
1
2

≠1

SOLVING MOCK-UP QUESTIONS: Q1

Examples of
Associated
Exercises:
MATRICES

Command Window

New to MATLAB? See resources for [Getting Started](#).

```
>> A
A =
    2     1     1     1
    1     2     1     1
    1     1     2     1

>> A(:, 1)
ans =
    2
    1
    1

>> [A(2, :) , A(3, :) ]
ans =
    1     2     1     1
    1     1     2     1

>> size(A)
ans =
    3     4
```

SOLVING MOCK-UP QUESTIONS: Q1

1. TASK ITESLF with ILLUSTRATION FIGURE

TASK-1 (Basic matrix operations with MATLAB)

Consider matrix A generated by the following expression:

$A = \text{ones}(3,4) + \text{eye}(3,4)$.

Which of the following is true?

Figure-1: Entering your given matrix A via MATLAB's Command Window.

```
Command Window
New to MATLAB? See resources for Getting Started.
>> A = ones(3,4) + eye(3,4)
```

3. INSPECTING OPTIONS: ONE-BY-ONE

PLEASE, READ ADDITIONAL RECOMMENDATIONS AND ENTER YOUR

ANSWERS for TASK-1 BELOW: *

Important: task may have several correct answers and if this is the case, in order to earn points you need to tick ALL correct answers and at the same time do not tick any incorrect answer.

- The value of $A(:,3)$ is 1
- A(6) is equal to 1
- $A+1116i$ gives an error
- A is equal to its transpose (i.e. A')
- $A(\text{end},\text{end})$ is equal to 1
- $\text{size}(A,2)$ is equal to 2

2. ENTERING "A" in Command Window

Command Window

New to MATLAB? See resources for [Getting Started](#).

```
>> A = ones(3,4) + eye(3,4)
```

A =

2	1	1	1
1	2	1	1
1	1	2	1

4. CHECKING FIRST OPTION ANSWER:

Command Window

New to MATLAB? See resources for [Getting Started](#).

```
>> A(6)
```

ans =

1

=1

SOLVING MOCK-UP QUESTIONS: Q1

Examples of
Associated
Exercises:
MATRICES

Command Window

New to MATLAB? See resources for [Getting Started](#).

```
>> A
```

A =

2	1	1	1
1	2	1	1
1	1	2	1

Command Window

New to MATLAB? See resources for [Getting Started](#).

```
>> [A(1) A(2) A(3) A(4) A(5) A(6) A(7) A(8) A(9) A(10) A(11) A(12)]
```

ans =

2	1	1									
			1	2	1						
					1	1	2				

```
>> A(:)
```

ans =

2											
1											
1											
1											
2											
1											
1											
2											
1											
1											
1											

SOLVING MOCK-UP QUESTIONS: Q1

1. TASK ITESLF with ILLUSTRATION FIGURE

TASK-1 (Basic matrix operations with MATLAB)

Consider matrix A generated by the following expression:

$A = \text{ones}(3,4) + \text{eye}(3,4)$.

Which of the following is true?

Figure-1: Entering your given matrix A via MATLAB's Command Window.

```
Command Window
New to MATLAB? See resources for Getting Started.
>> A = ones(3,4) + eye(3,4)
```

3. INSPECTING OPTIONS: ONE-BY-ONE

PLEASE, READ ADDITIONAL RECOMMENDATIONS AND ENTER YOUR

2 points

ANSWERS for TASK-1 BELOW: *

Important: task may have several correct answers and if this is the case, in order to earn points, you need to tick ALL correct answers and at the same time do not tick any incorrect answer.

The value of $A(:,3)$ is 1

A(6) is equal to 1

$A+1116*i$ gives an error

A is equal to its transpose (i.e. A')

$A(\text{end},\text{end})$ is equal to 1

$\text{size}(A,2)$ is equal to 2

2. ENTERING "A" in Command Window

Command Window

New to MATLAB? See resources for [Getting Started](#).

```
>> A = ones(3,4) + eye(3,4)
```

A =

2	1	1	1
1	2	1	1
1	1	2	1

4. CHECKING FIRST OPTION ANSWER:

```
Command Window
New to MATLAB? See resources for Getting Started.
>> A+1116*i
ans =
1.0e+03 *
0.0020 + 1.1160i 0.0010 + 1.1160i 0.0010 + 1.1160i 0.0010 + 1.1160i
0.0010 + 1.1160i 0.0020 + 1.1160i 0.0010 + 1.1160i 0.0010 + 1.1160i
0.0010 + 1.1160i 0.0010 + 1.1160i 0.0010 + 1.1160i 0.0010 + 1.1160i
```

No error

SOLVING MOCK-UP QUESTIONS: Q1

1. TASK ITESLF with ILLUSTRATION FIGURE

TASK-1 (Basic matrix operations with MATLAB)

Consider matrix A generated by the following expression:

$A = \text{ones}(3,4) + \text{eye}(3,4)$.

Which of the following is true?

Figure-1: Entering your given matrix A via MATLAB's Command Window.

```
Command Window  
New to MATLAB? See resources for Getting Started.  
>> A = ones(3,4) + eye(3,4)
```

3. INSPECTING OPTIONS: ONE-BY-ONE

PLEASE, READ ADDITIONAL RECOMMENDATIONS AND ENTER YOUR ANSWERS for TASK-1 BELOW: *

Important: task may have several correct answers and if this is the case, in order to earn points, you need to tick ALL correct answers and at the same time do not tick any incorrect answer.

- The value of $A(:,3)$ is 1
- (6) is equal to 1
- $A+1116*i$ gives an error
- A is equal to its transpose (i.e. A')
- $A(\text{end},\text{end})$ is equal to 1
- $\text{size}(A,2)$ is equal to 2

2. ENTERING "A" in Command Window

```
Command Window  
New to MATLAB? See resources for Getting Started.  
>> A = ones(3,4) + eye(3,4)  
  
A =  
  
2 1 1 1  
1 2 1 1  
1 1 2 1
```

4. CHECKING FIRST OPTION ANSWER:

```
Command Window  
New to MATLAB? See resources for Getting Started.  
>> A'  
  
ans =  
  
2 1 1  
1 2 1  
1 1 2  
1 1 1
```

$A \neq A'$, also $\text{size}(A) \neq \text{size}(A')$

SOLVING MOCK-UP QUESTIONS: Q1

Examples of
Associated
Exercises:
MATRICES

Command Window

New to MATLAB? See resources for [Getting Started](#).

```
>> A'
```

ans =

2	1	1
1	2	1
1	1	2
1	1	1

```
>> transpose (A)
```

ans =

2	1	1
1	2	1
1	1	2
1	1	1

SOLVING MOCK-UP QUESTIONS: Q1

1. TASK ITESLF with ILLUSTRATION FIGURE

TASK-1 (Basic matrix operations with MATLAB)

Consider matrix A generated by the following expression:

$A = \text{ones}(3,4) + \text{eye}(3,4)$.

Which of the following is true?

Figure-1: Entering your given matrix A via MATLAB's Command Window.

Command Window
New to MATLAB? See resources for [Getting Started](#).
`>> A = ones(3,4) + eye(3,4)`

3. INSPECTING OPTIONS: ONE-BY-ONE

PLEASE, READ ADDITIONAL RECOMMENDATIONS AND ENTER YOUR ANSWERS for TASK-1 BELOW: *

Important: task may have several correct answers and if this is the case, in order to earn points, you need to tick ALL correct answers and at the same time do not tick any incorrect answer.

The value of $A(:,3)$ is 1

(6) is equal to 1

$A+1116i$ gives an error

A is equal to its transpose (i.e. A')

$A(\text{end},\text{end})$ is equal to 1

$\text{size}(A,2)$ is equal to 2

2. ENTERING "A" in Command Window

Command Window
New to MATLAB? See resources for [Getting Started](#).
`>> A = ones(3,4) + eye(3,4)`

 $A =$

2	1	1	1
1	2	1	1
1	1	2	1

4. CHECKING FIRST OPTION ANSWER:

Command Window
New to MATLAB? See resources for [Getting Started](#).

`>> A(end,end)`

$ans =$

1

$A(\text{end},\text{end}) = 1$

SOLVING MOCK-UP QUESTIONS: Q1

1. TASK ITESLF with ILLUSTRATION FIGURE

TASK-1 (Basic matrix operations with MATLAB)

Consider matrix A generated by the following expression:

$A = \text{ones}(3,4) + \text{eye}(3,4)$.

Which of the following is true?

Figure-1: Entering your given matrix A via MATLAB's Command Window.

```
Command Window
New to MATLAB? See resources for Getting Started.
>> A = ones(3,4) + eye(3,4)
```

3. INSPECTING OPTIONS: ONE-BY-ONE

PLEASE, READ ADDITIONAL RECOMMENDATIONS AND ENTER YOUR ANSWERS for TASK-1 BELOW: *

Important: task may have several correct answers and if this is the case, in order to earn points, you need to tick ALL correct answers and at the same time do not tick any incorrect answer.

- The value of $A(:,3)$ is 1
- (6) is equal to 1
- $A+1116i$ gives an error
- A is equal to its transpose (i.e. A')
- (end,end) is equal to 1
- $\text{size}(A,2)$ is equal to 2

2. ENTERING "A" in Command Window

```
Command Window
New to MATLAB? See resources for Getting Started.
>> A = ones(3,4) + eye(3,4)

A =

 2     1     1     1
 1     2     1     1
 1     1     2     1
```

4. CHECKING FIRST OPTION ANSWER:

Command Window

New to MATLAB? See resources for [Getting Started](#).

```
>> size(A, 2)
```

ans =

4

≠ 2

```
>> size(A)
```

ans =

3 4

SOLVING MOCK-UP QUESTIONS: Q1

1. TASK ITESLF with ILLUSTRATION FIGURE

TASK-1 (Basic matrix operations with MATLAB)

Consider matrix A generated by the following expression:

$A = \text{ones}(3,4) + \text{eye}(3,4)$.

Which of the following is true?

Figure-1: Entering your given matrix A via MATLAB's Command Window.

Command Window
New to MATLAB? See resources for [Getting Started](#).
`>> A = ones(3,4) + eye(3,4)`

2. ENTERING “A” in Command Window

Command Window
New to MATLAB? See resources for [Getting Started](#).
`>> A = ones(3,4) + eye(3,4)`
A =
2 1 1 1
1 2 1 1
1 1 2 1

3. INSPECTING OPTIONS: ONE-BY-ONE

PLEASE, READ ADDITIONAL RECOMMENDATIONS AND ENTER YOUR ANSWERS for TASK-1 BELOW: *

Important: task may have several correct answers and if this is the case, in order to earn points, you need to tick ALL correct answers and at the same time do not tick any incorrect answer.

- The value of $A(:,3)$ is 1
- (6) is equal to 1
- $A+1116*i$ gives an error
- A is equal to its transpose (i.e. A')
- (end,end) is equal to 1
- $\text{size}(A,2)$ is equal to 2

- Correct answer
- A(6) is equal to 1
 - A(end,end) is equal to 1

4. CORRECT ANSWERS

TO GET POINTS, ENTER BOTH CORRECT ANSWERS

SOLVING MOCK-UP QUESTIONS: Q2

1. TASK ITESLF with ILLUSTRATION FIGURE

TASK-2 ("MUST KNOW" commands in MATLAB: "find")

In order to plot function $y(t) = \exp(-0.3t) \sin(4t)$, the "t" and "y" arrays were generated in MATLAB, using the following commands, enterd from the Command Window:

```
>> t=[0:0.01:5]; y = exp(-0.3*t).*sin(4*t);
```

Use "find" command, in combination with other relevant commands, to determine the number of elements in array "y", for which their values are larger than "0.5" ("more than plus 0.5"). This number is equal to:

Figure-2: The equation of the given function $y(x)$.

$$y(t) = e^{-0.3t} \sin(4t)$$

4. SELECTING CORRECT SINGLE OPTION

PLEASE, ENTER YOUR ANSWER for TASK-2 BELOW: *

2 point

- 57
- 71
- 93
- 104
- 111
- None of the above.

2. ENTERING "y" in Command Window

Command Window

New to MATLAB? See resources for [Getting Started](#).

```
>> t=[0:0.01:5]; y = exp(-0.3*t).*sin(4*t);
```

3. SOLVING TASK, using MATLAB:

Command Window

New to MATLAB? See resources for [Getting Started](#).

```
>> idx=find(y>0.5); length(idx)
```

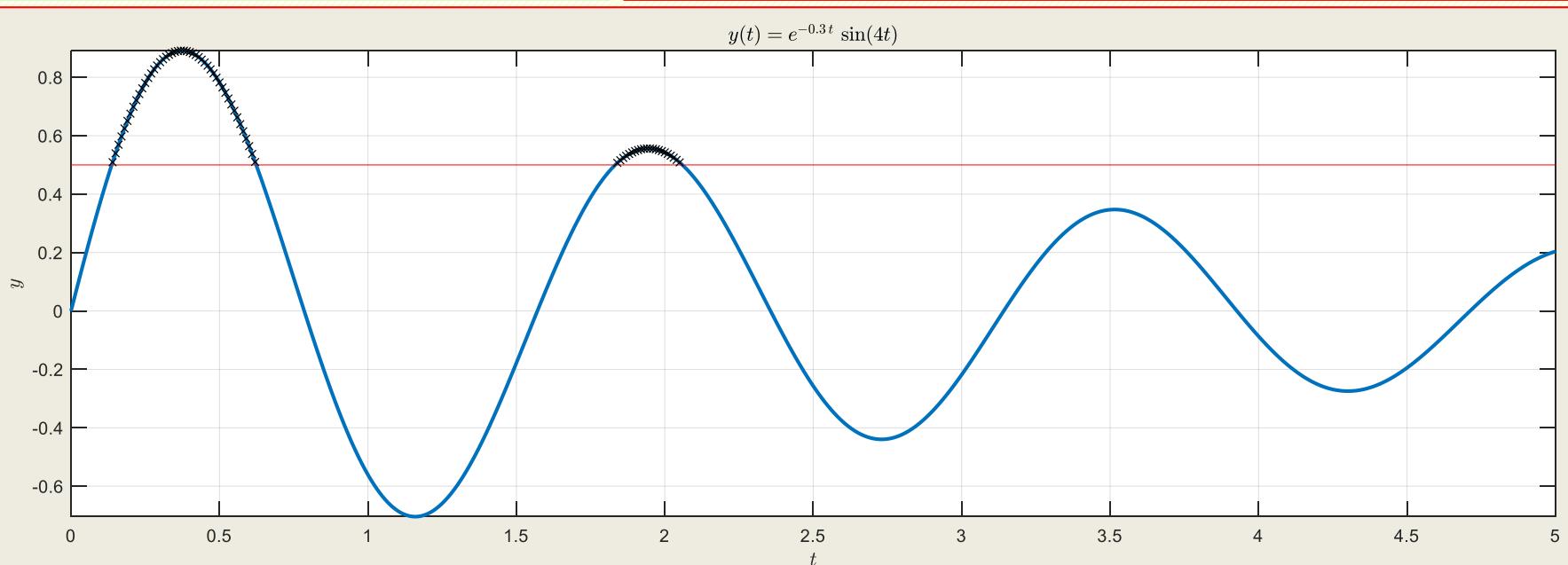
ans =

[71]

= 71

Advanced Solution for Curious Students

```
%% MOCK-UP Q2: Programmed by Prof P.M.Trivailo © 2020
% Graphically Illustrated Solution
clc; clear; close all
t=[0:0.01:5]; y=exp(-0.3*t).*sin(4*t);
plot(t,y,'LineWidth',2); grid on;
set(gcf, 'Position', [90 438 1407 420]);
ti=title('$y(t) = e^{-0.3 t}, \sin(4t)$');
xl=xlabel('$t$'); yl=ylabel('$y$');
set([ti,xl,yl], 'Interpreter', 'LaTeX');
Threshold=0.50;
hold on; axis tight; ax=axis;
line('XData',ax(1:2), 'YData',[1 1]*Threshold, 'Color', 'r');
idx=find(y > Threshold); NN=length(idx);
fprintf('length(find(y > %6.2f)) = %i \n', Threshold, NN)
plot(t(idx),y(idx),'kx');
% --- ANSWER ---
%length(find(y > 0.50)) = 71
% --- ANSWER ---
commandwindow
```



SOLVING MOCK-UP QUESTIONS: Q3

1. TASK ITESLF with ILLUSTRATION FIGURE

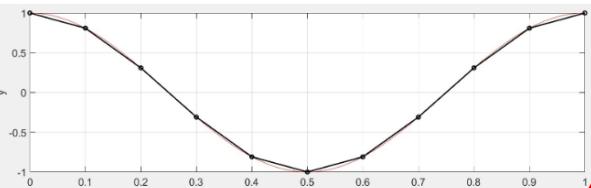
TASK-3 ("MUST KNOW" commands in MATLAB: "interp1")

A 'y(t)' function was plotted in MATLAB using the following commands:

```
t=[0:0.01:1]; y=cos(2*pi*t); plot(t,y,'r'); grid on; hold on;
```

Then, set of additional commands was used to superimpose interpolated data, with a resultant plot shown below. Which set of additional commands was used to produce the presented plot?

Figure-3: Resultant plot, presenting plot with initial data and superimposed plot with linearly interpolated data.



3. PLOTTING via Command Window

Command Window

New to MATLAB? See resources for [Getting Started](#).

```
>> t=[0:0.01:1]; y=cos(2*pi*t); plot(t,y,'r');
```

```
>> grid on; hold on; xlabel('t'); ylabel('y');
```

```
>> t2=[0:0.25:1]; y2=interp(t,y,t2); plot(t2,y2,'k-o','LineWidth',2);
```

Error using [interp](#)

Expected r to be a scalar with value >= 1.

Error in [interp](#) (line 48)

```
validateattributes(r,{'numeric'},{'>=',1,'finite','integer','scalar'},'interp','r');
```

Error in [a1q1_exercises](#) (line 145)

```
t2=[0:0.25:1]; y2=interp(t,y,t2); plot(t2,y2,'k-o','LineWidth',2);
```

2. INSPECTING OPTIONS: ONE-BY-ONE

PLEASE, ENTER YOUR ANSWER for TASK-3 BELOW: *

- t2=[0:0.25:1]; y2=interp(t,y,t2); plot(t2,y2,'k-o','LineWidth',2);
- t2=[0:0.25:1]; y2=interp1(t,y,t2); plot(t2,y2,'k-o','LineWidth',2);
- t2=[0:0.05:1]; y2=interp1(t,y,t2); plot(t2,y2,'b-o','LineWidth',2);
- t2=[0:0.1:1]; y2=interp1(t,y,t2); plot(t2,y2,'k-o','LineWidth',2);
- t2=[0:0.5:1]; y2=interp1(t,y,t2); plot(t2,y2,'k-o','LineWidth',2);
- None of the above.

4. CHECKING FIRST OPTION ANSWER:

2 points

MATLAB Error message,
hence, option-1 is a
wrong answer

Figure 1

CHECKING 2nd, 3rd, 4th and 5th OPTIONS ANSWERS:

File Edit View Insert Tools Desktop Window Help

File Edit View Insert Tools Desktop Window Help

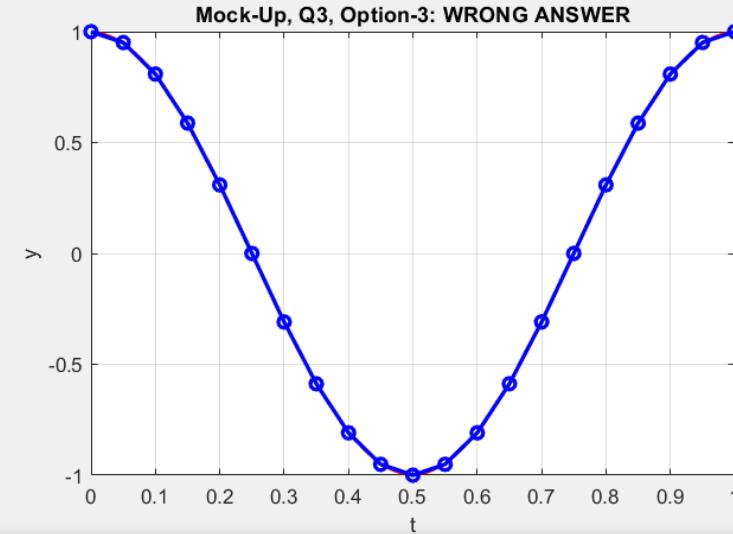
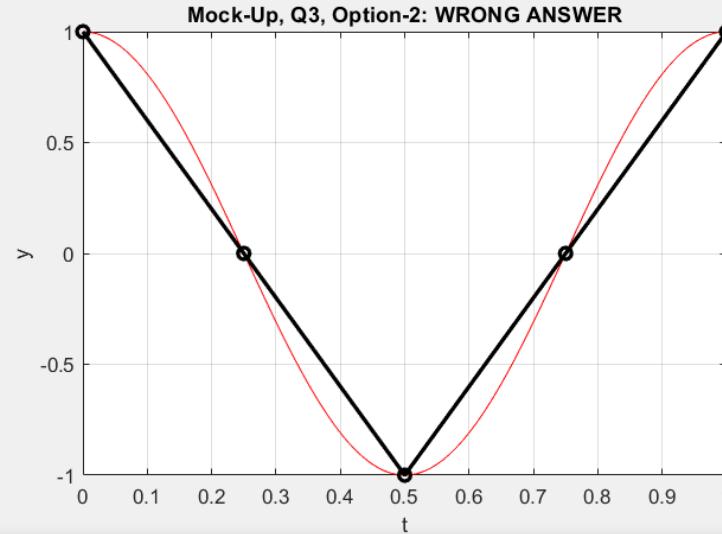
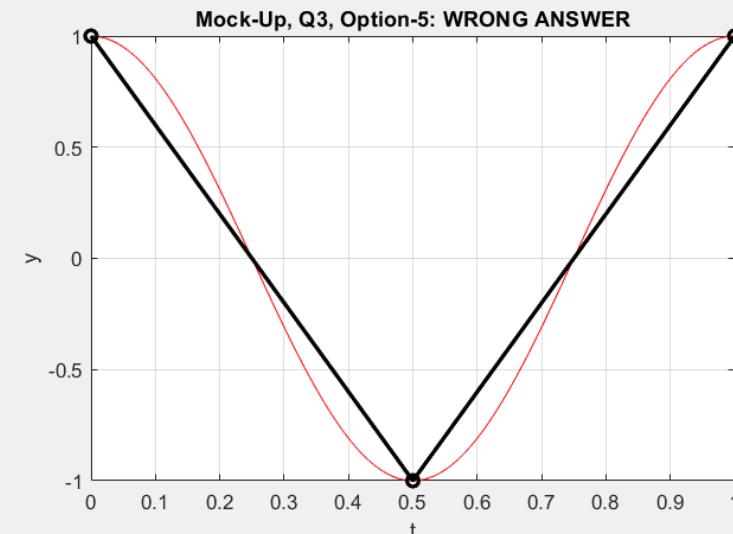
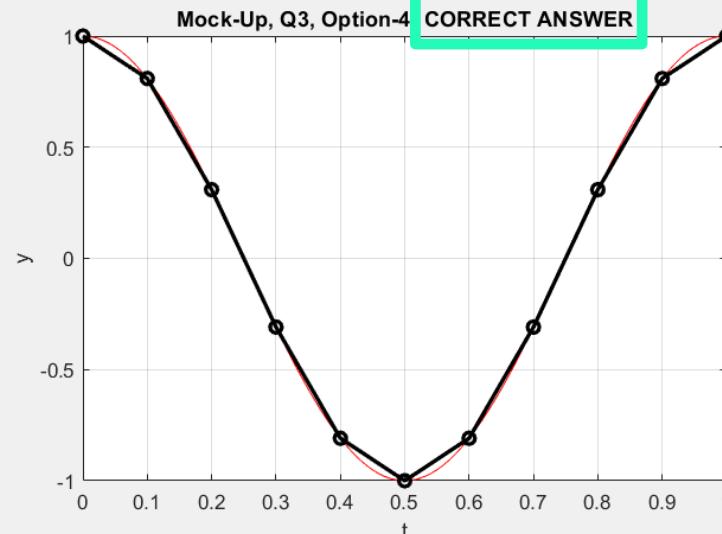


Figure 3

File Edit View Insert Tools Desktop Window Help

Figure 4

File Edit View Insert Tools Desktop Window Help



SOLVING MOCK-UP QUESTIONS: Q4

1. TASK ITESLF with ILLUSTRATION FIGURE

TASK-4 ("MUST KNOW" formatted string printing in MATLAB)

Which of the following is printed to standard output when the following expression is executed:

```
fprintf('max temp is %.2f degree \n',100.2345)
```

Figure-4: Example of the formatted string print, using the following one-line MATLAB commands, entered from command window:

```
clc; fprintf('OENG-%s is a great  
Course%\n',char(10122,10122,10122,10127),char(10069,9786))
```

Command Window

New to MATLAB? See resources for [Getting Started](#).

OENG-11116 is a great Course! ☺

fx >>

3. SELECTING CORRECT SINGLE OPTION

PLEASE, READ ADDITIONAL RECOMMENDATIONS AND ENTER YOUR ANSWER for TASK-4 BELOW: *

2 points

Recommendation: Carefully consider the given script, understand each of the commands, execute, analyse results.

Always use "help" or "doc" commands in combination with the function, which you are not quite familiar with, for example, "doc fprintf" or "help fprintf".

- max temp is %.2f degree',100.2345
- max temp is %.2f degree 100.2345
- max temp is 100.23 degree
- max temp is 100.2345 degree
- Invalid syntax
- None of the above.

2. ENTERING "string" in Command Window

```
Command Window
New to MATLAB? See resources for Getting Started.
>> fprintf('max temp is %.2f degree \n',100.2345)
max temp is 100.23 degree
```

TASK-5 (Basic practical calculations with MATLAB)

The exact analytical solution for the distance "y" that a free falling body has travelled (neglecting air friction) is "y = - gt^2/2" [here selected "y" axis is directed "up", as per the Figure].

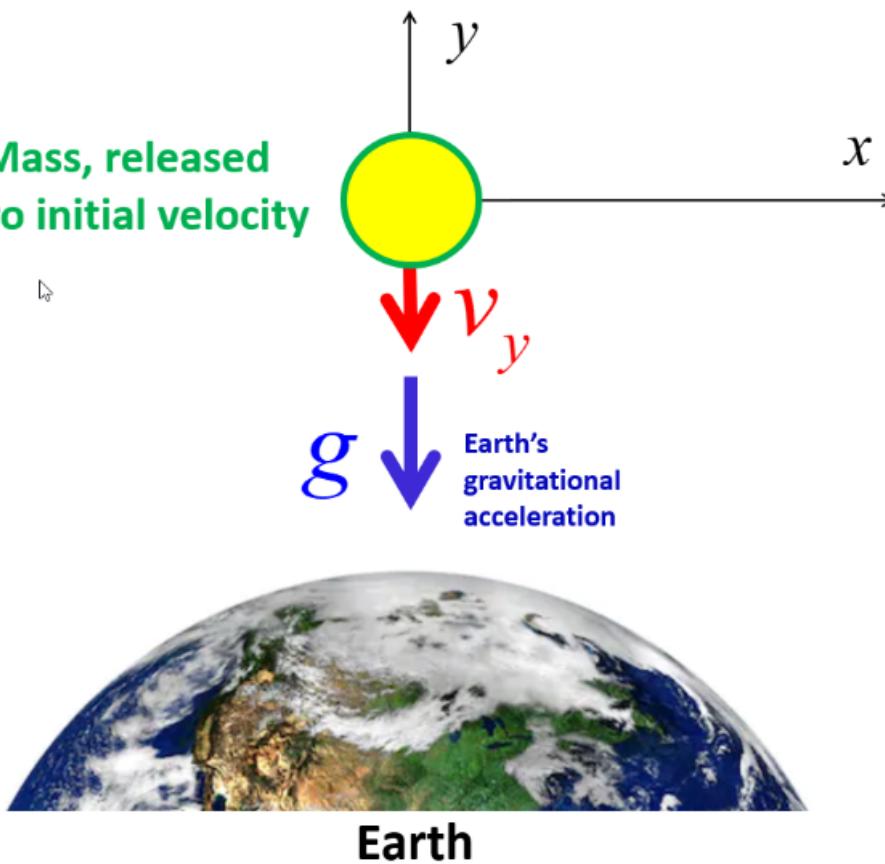
Assume that g = 9.81 m/s^2. Which of the following expressions generates a table of time (in the first column) versus distance traveled (in the second column) for time from 0 to 10 seconds?

1. TASK ITESLF with ILLUSTRATION FIGURE

Figure-5: Falling mass with selected axis system

Recommendation: for each choice, execute MATLAB commands and observe the result; then study in depth these commands, if necessary.

Falling Mass, released with zero initial velocity



SOLVING MOCK-UP QUESTIONS: Q5

2. TESTING ANSWER OPTION-1

Command Window

New to MATLAB? See resources for [Getting Started](#).

```
>> %===== Q5: OPTION-1: SYNTAX ERROR! =====
```

```
>>
```

```
>> t=0,10; g=-9.81; y(t)=0.5*g*t^2; disp([t,y']);
```

```
t =
```

```
0
```

SYNTAX ERROR, hence, WRONG ANSWER

Array indices must be positive integers or logical values.

Error in a1q1_exercises (line 234)

```
t=0,10; g=-9.81; y(t)=0.5*g*t^2; disp([t,y']);
```

2. TESTING ANSWER OPTION-2

Command Window

New to MATLAB? See resources for [Getting Started](#).

```
>> %===== Q5: OPTION-2 ======  
>> t=0:10; g=-9.81; y=0.5*g*t.^2; disp([y',t']);
```

0	0
-4.9050	1.0000
-19.6200	2.0000
-44.1450	3.0000
-78.4800	4.0000
-122.6250	5.0000
-176.5800	6.0000
-240.3450	7.0000
-313.9200	8.0000
-397.3050	9.0000
-490.5000	10.0000

fx

**TIME is in the
SECOND COLUMN,
hence, WRONG ANSWER**

2. TESTING ANSWER OPTION-3

Command Window

New to MATLAB? See resources for [Getting Started](#).

```
>> %===== Q5: OPTION-3: SYNTAX ERROR! =====
```

```
>> t=[0,10]; g=-9.81; y(t)=-0.5*g*t^2; disp([t,y]');
```

```
Error using ^ (line 5)
```

Incorrect dimensions for raising a matrix to a power. Check that the matrix is square and the power is a scalar. To perform elementwise matrix powers, use '.^'.

```
Error in a1q1_exercises (line 24)
```

```
t=[0,10]; g=-9.81; y(t)=-0.5*g*t^2; disp([t,y]');
```

SYNTAX ERROR, hence, WRONG ANSWER
ELEMENT by ELEMENT SQUARE SHOULD BE USED!
Also, $y(t)$ is wrong syntax!

Etc.

Continue with all other options

2. TESTING ANSWER OPTION-5

Command Window

New to MATLAB? See resources for [Getting Started](#).

```
>> %===== Q5: OPTION-5 =====  
>> t=0:10; g=-9.81; y=0.5*g*t.^2; disp([t',y']);
```

t	y
0	0
1.0000	-4.9050
2.0000	-19.6200
3.0000	-44.1450
4.0000	-78.4800
5.0000	-122.6250
6.0000	-176.5800
7.0000	-240.3450
8.0000	-313.9200
9.0000	-397.3050
10.0000	-490.5000

TIME is in the
FIRST COLUMN,
DISTANCE
with correct sign (as per
selected coordinate system)
is in the
SECOND COLUMN
hence, CORRECT ANSWER

SOLVING MOCK-UP QUESTIONS: Q5

ANSWERING MOCK-UP Q5

PLEASE, READ ADDITIONAL RECOMMENDATIONS AND ENTER YOUR ANSWERS for TASK-5 BELOW: *

2 points

Recommendation: for each choice, execute MATLAB commands and observe the result; then study in depth these commands, if necessary.

Always use "help" or "doc" commands in combination with the function, which you are not quite familiar with, for example, "help cross".

Important: task may have several correct answers and if this is the case, in order to earn points, you need to tick ALL correct answers and at the same time do not tick any incorrect answer.

- `t=0,10; g=-9.81; y(t)=0.5*g*t^2; disp([t,y])`;
- `t=0:10; g=-9.81; y=0.5*g*t.^2; disp([y,t'])`;
- `t=[0,10]; g=-9.81; y(t)=-0.5*g*t^2; disp([t,y])`;
- `t=0:10; g=-9.81; y(t)=-0.5*g*t^2; disp([t',y'])`;
- `t=0:10; g=-9.81; y=0.5*g*t.^2; disp([t',y'])`;
- `t=0:10; g=-9.81; y=0.5*g*t.^2; disp([t,y])`;

**ONLY AFTER CHECKING EACH ANSWER OPTION,
WE CAN NOW CLICK
ALL CORRECT ANSWERS IN THE LIST.**

**NOTE: THERE MAY BE MORE THAN ONE
CORRECT ANSWERS!**

**However, in this case of Q4,
it was only ONE correct answer, given by Option-5.**

SOLVING MOCK-UP QUESTIONS: Q6

1. TASK ITESLF with ILLUSTRATION FIGURE

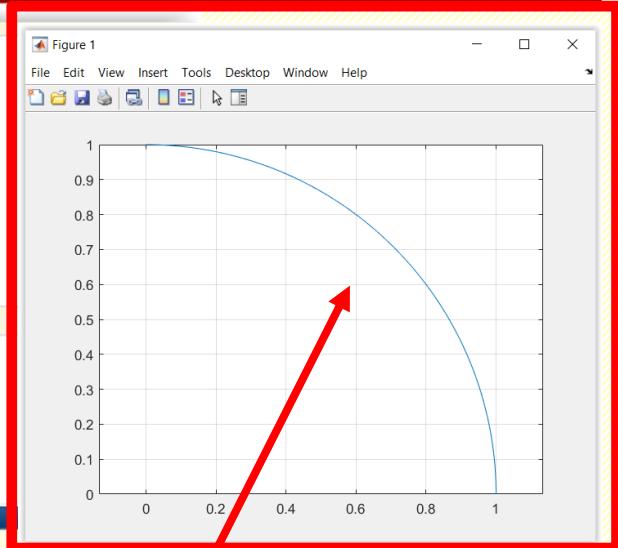
TASK-6 ("MUST KNOW" basic 2D plots with MATLAB)

What is the output of the following code?

```
f1=figure; t=[0:.001:1]*2*pi; plot(abs(cos(t)),abs(sin(t))); axis equal; grid on; figure(f1);
```

Figure-6: Example of the MATLAB script, entered via Command Window.

```
Command Window  
New to MATLAB? See resources for Getting Started.  
>> f1=figure; t=[0:.001:1]*2*pi; plot(abs(cos(t)),abs(sin(t))); axis equal; grid on; figure(f1);
```



Command Window

New to MATLAB? See resources for [Getting Started](#).

```
>>  
>> %===== Q6: OPTION-5: ENTERING SPECIFIED COMMANDS =====  
>> f1=figure; t=[0:.001:1]*2*pi; plot(abs(cos(t)),abs(sin(t)));  
>> axis equal; grid on; figure(f1);  
fx >> |
```

SOLVING MOCK-UP QUESTIONS: Q6

ANSWERING MOCK-UP Q6

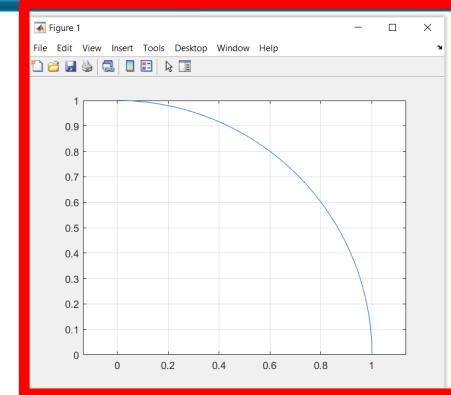
PLEASE, READ ADDITIONAL RECOMMENDATIONS AND ENTER YOUR ANSWER for TASK-6 BELOW: *

2 points

Recommendation: Carefully consider the given script, understand each of the commands, execute, analyse results.

Always use "help" or "doc" commands in combination with the function, which you are not quite familiar with, for example, "help cross".

Important: task may have several correct answers and if this is the case, in order to earn points, you need to tick ALL correct answers and at the same time do not tick any incorrect answer.



- A straight line
- A plot of the "sin" function (sinusoid).
- A quarter of a unit circle
- A unit circle (complete)
- A half of the unit circle
- None of the above.

**ONLY AFTER CHECKING EACH ANSWER OPTION,
WE CAN NOW CLICK
THE ONLY CORRECT ANSWERS IN THIS MCQ.**

**NOTE: THIS TYPE OF QUESTION (with "Circles")
HAS ONLY ONE CORRECT ANSWER!**

The only ONE correct answer is given by Option-3.

SOLVING MOCK-UP QUESTIONS: Q7

1. TASK ITESLF with ILLUSTRATION FIGURE

TASK-7 (Basic 2D plots with MATLAB)

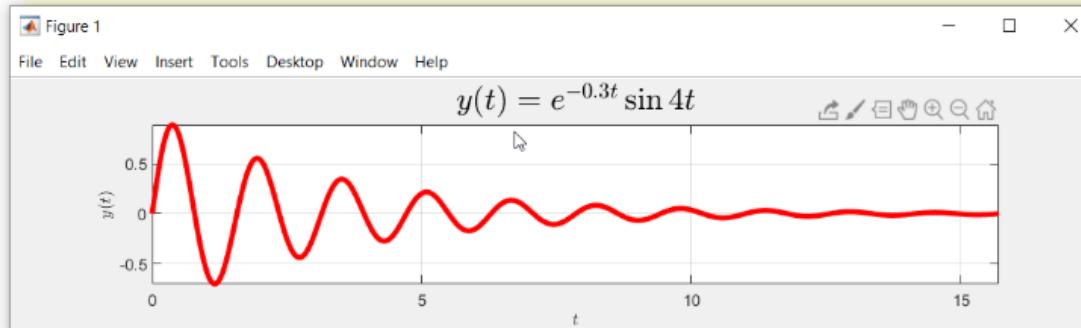
Figure below shows an example of MATLAB script and the 2D plot, which this script can produce. For each of the choices below in the Multiple-choice question, use the supplied MATLAB commands to plot various 2D curves.

Which of these (if any) represent a "square" shape?

Important: task may have several correct answers and if this is the case, in order to earn points, you need to tick ALL correct answers and at the same time do not tick any incorrect answer.

Figure-7: Example of MATLAB script, producing 2D plot ("damping response").

```
%%
f1=figure; t=0:0.01:5*pi;
plot(t, sin(4*t).*exp(-0.3*t),'r','LineWidth',3); grid on; axis tight;
xl=xlabel('$t$'); yl=ylabel('$y(t)$');
tit=title('$y(t) = e^{-0.3t} \sin 4t$', 'FontSize',18);
set([tit,xl,yl], 'Interpreter','LaTeX'); figure(f1);
```



3. INSPECTING OPTIONS: ONE-BY-ONE; UNDERSTANDING COMMANDS & OBSERVING RESULTS

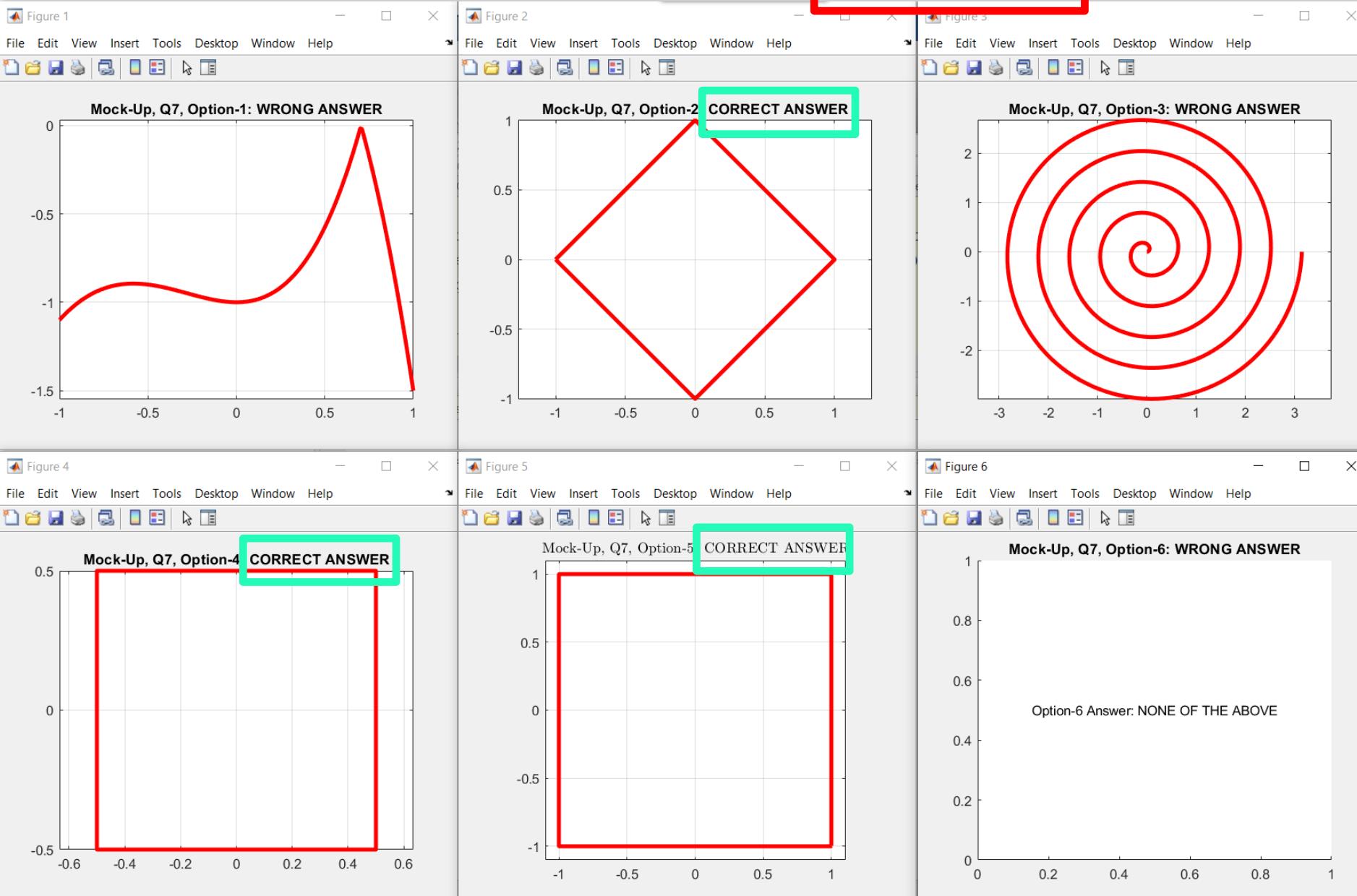
PLEASE, READ ADDITIONAL RECOMMENDATIONS AND ENTER YOUR ANSWERS for TASK-7 BELOW: *

2 points

Important: task may have several correct answers and if this is the case, in order to earn points, you need to tick ALL correct answers and at the same time do not tick any incorrect answer.

- `f1=figure; x=[-1:0.01:1]; y=-abs(1-x.^2-1.3*x.^3-0.2*x.^4); plot(x,y,'r','LineWidth',3); grid on; axis equal; figure(f1);`
- `f1=figure; xx=[-1:0.01:1]; x=[xx, xx(end:-1:1)]; y = [abs(1-abs(xx)) -abs(1-abs(xx))]; plot(x,y,'r','LineWidth',3); grid on; axis equal; figure(f1);`
- `f1=figure; t=[0:0.001:1]*10*pi; v=0.1; w=1; x=v*t.*cos(w*t); y=v*t.*sin(w*t); plot(x, y,'r','LineWidth',3); grid on; axis equal; figure(f1);`
- `f1=figure; t=[0:0.001:1]*2.1*pi; x=0.5*sign(cos(t)); y=0.5*sign(sin(t)); plot(x, y,'r','LineWidth',3); grid on; axis equal; figure(f1);`
- `f1=figure; fimplicit(@(x,y) abs(x + y) + abs(x - y) -2 , [-1.1 1.1 -1.1 1.1],'r','LineWidth',3); axis equal; grid on; title('$|x+y| + |x-y| = 2$','Interpreter','LaTeX'); figure(f1);`
- None of the above

2. ENTERING SPECIFIED COMMANDS TO OBSERVE RESULTS



SOLVING MOCK-UP QUESTIONS: Q7

ANSWERING MOCK-UP Q7

PLEASE, READ ADDITIONAL RECOMMENDATIONS AND ENTER YOUR ANSWERS for TASK-7 BELOW: *

2 points

Important: task may have several correct answers and if this is the case, in order to earn points, you need to tick ALL correct answers and at the same time do not tick any incorrect answer.

- `f1=figure; x=[-1:0.01:1]; y=-abs(1-x.^2-1.3*x.^3-0.2*x.^4); plot(x,y,'r','LineWidth',3); grid on; axis equal; figure(f1);`
- `f1=figure; xx=[-1:0.01:1]; x=[xx, xx(end)]; y=[yy, yy(end)]; plot(x,y,'r','LineWidth',3); grid on; axis`
- `f1=figure; t=[0:0.001:1]*10*pi; v=0.1; y='r','LineWidth',3); grid on; axis equal;`
- `f1=figure; t=[0:0.001:1]*2.1*pi; x=0.5; y='r','LineWidth',3); grid on; axis equal;`
- `f1=figure; fimplicit(@(x,y) abs(x + y)); axis equal; grid on; title('$|x+y| + |x-y| = 1$');`
- None of the above

**ONLY AFTER CHECKING EACH ANSWER OPTION,
WE CAN NOW CLICK
ALL CORRECT ANSWERS IN THE LIST.**

**NOTE: THERE MAY BE MORE THAN ONE
CORRECT ANSWERS!**

**In this case of Q7, there are THREE correct answers,
given by Option-2, Option-4 and Option-5.**

SOLVING MOCK-UP QUESTIONS: Q8

1. TASK ITESLF with ILLUSTRATION FIGURE

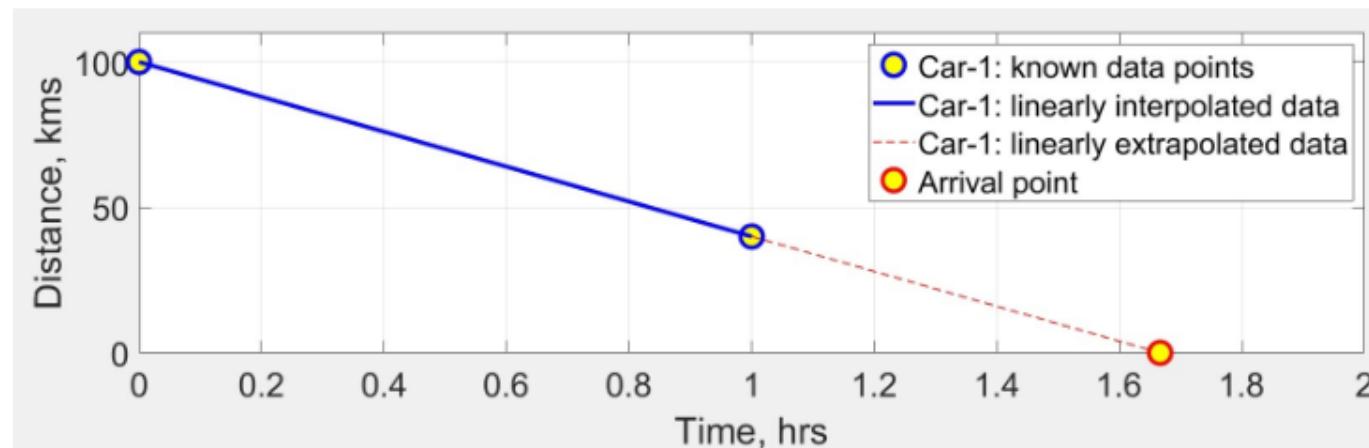
TASK-8 (Practical calculations with MATLAB: application of methods and tools)

Five cars [#1, #2, #3, #4, #5] were called to the emergency point. Initially they were at the distance of [190, 152, 108, 216, 210] kms from destination, accordingly.

Then, after some time, these distances changed to [90, 72, 48, 96, 70] kms.

Assuming constant own speed for each car, determine which car (or cars) will arrive to the emergency point last (i.e. later, than other cars)?

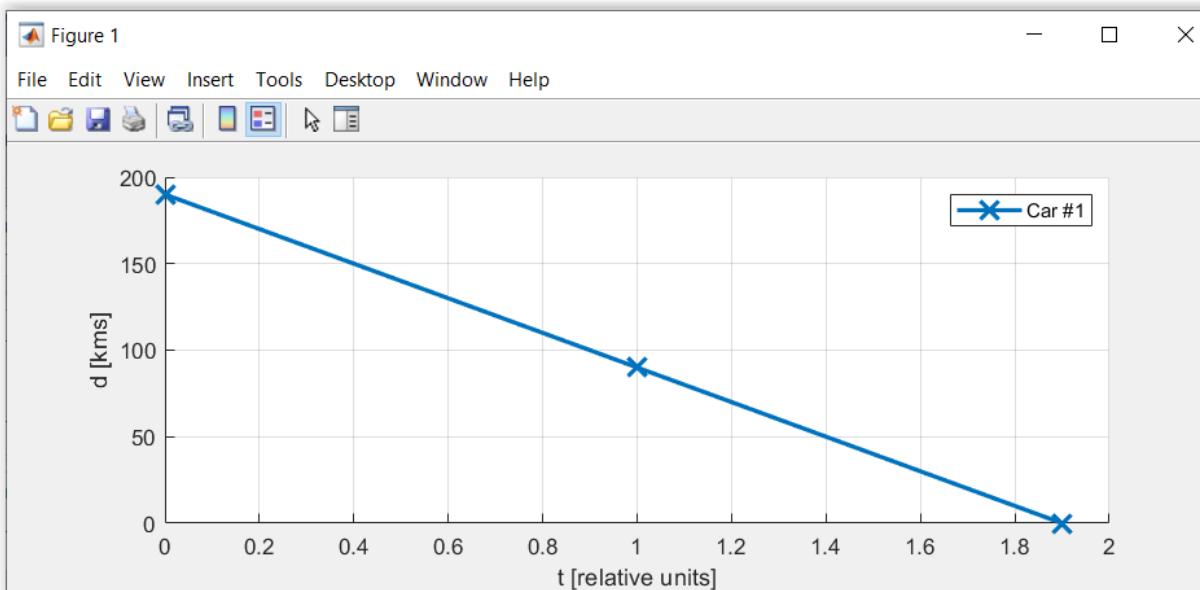
Figure-8: Example of the prediction of the arrival of the car, using linear extrapolation of the distance data.



SOLVING MOCK-UP QUESTIONS: Q8

EXAMPLE of the solution for Car-#1

```
%% MOCK-UP Q8: Programmed by Prof P.M.Trivailo © 2020
clear; close all; clc
dd=[190 90]; tt=[0 1]; figure; hold on; grid on;
ti=interp1(dd,tt, 0,'linear','extrap');
plot([0 1 ti], [dd,
0], 'LineWidth',2, 'Marker','x', 'MarkerSize',12, 'LineStyle', '-');
legend('Car #1'); xlabel('t [relative units]'); ylabel('d [kms]');
disp(sprintf('ARRIVAL TIME for CAR-#1: %6.2f [abstract relative units]',ti))
```



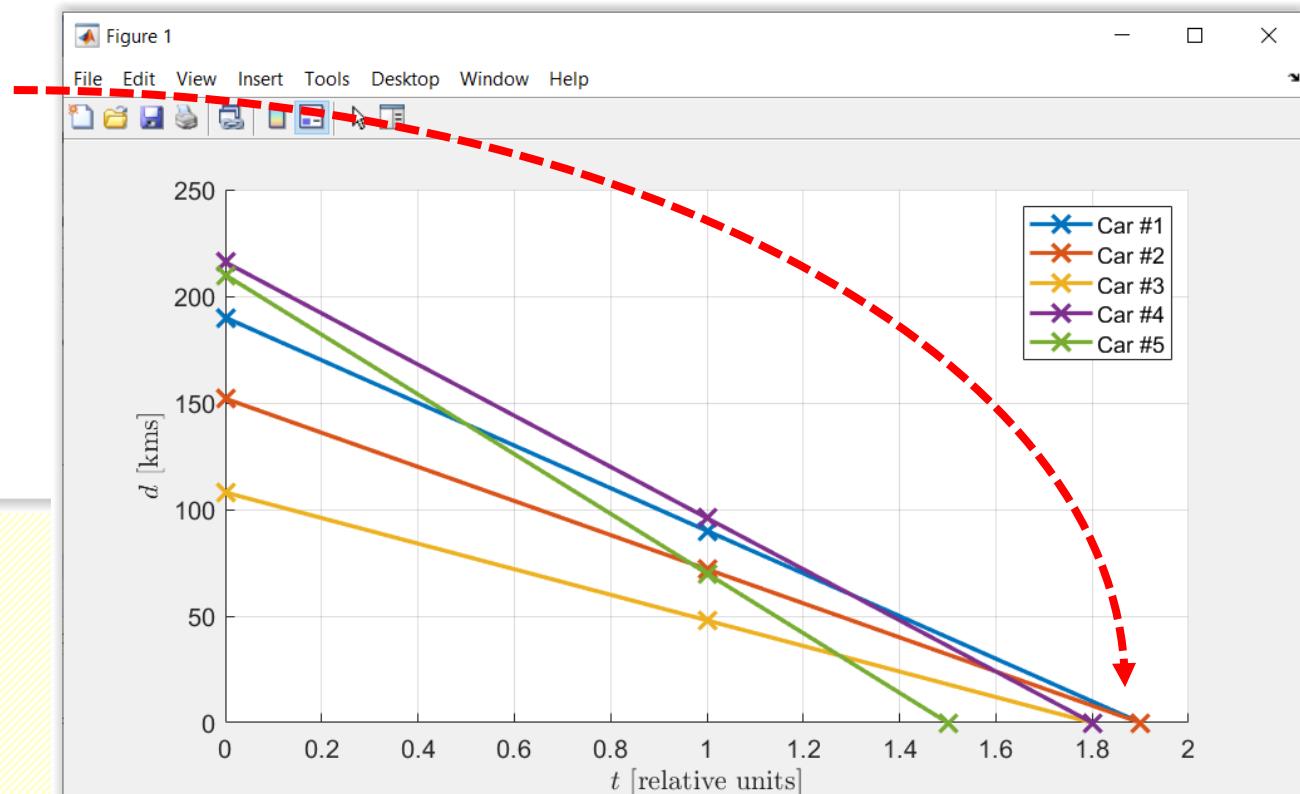
SOLVING MOCK-UP QUESTIONS: Q8

Solution for all Cars

PLEASE, ENTER YOUR ANSWER for TASK-8 BELOW: *

2 points

- #3
- #1 and #2 (simultaneously)
- #4
- #1 and #4 (simultaneously)
- #5
- None of the above.



SOLVING MOCK-UP QUESTIONS: Q9

1. TASK ITESLF with ILLUSTRATION FIGURE

TASK-9 (Basic calculations with MATLAB. application of commands: 'for', 'if', '==', '^' and 'sprintf')

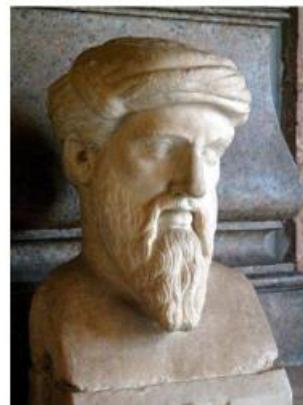
A "Pavel's Trivailo modified" Pythagorean triple consists of three positive integers 'a', 'b', and 'c', such that $a^2 + b^2 = c^2 - 1116^2$. [Always arrange numbers a and b to satisfy $a < b$].

For $c=2020$, find matching integers 'a' and 'b' (arrange them to satisfy $a < b$) and, as a confirmation of the successful solution found, enter into the answer field the value of the 'a' only ('a' must be smaller than 'b'). The task has several solutions (i.e. "a and b" pairs), enter only solution value for 'a' with the SMALLEST value of "a" out of the solution pairs found.

Good luck!

Figure-9: Bust of Pythagoras of Samos in the Capitoline Museums, Rome.

(Courtesy: Wikipedia <https://en.wikipedia.org/wiki/Pythagoras>)



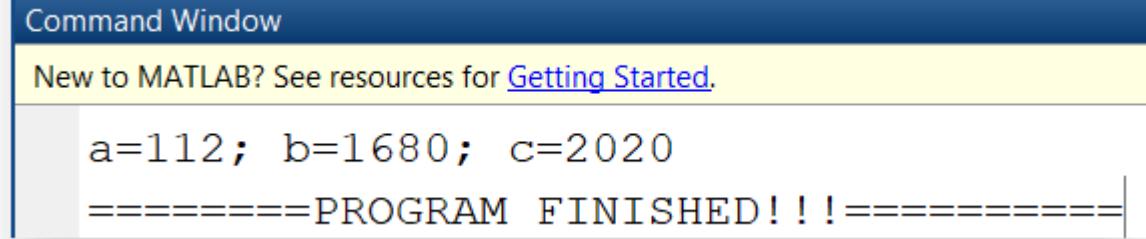
A Pythagorean triple:

$$a^2 + b^2 = c^2$$

(a , b and c are all integers)

MATLAB script: Solution of Q9

```
%%
clear; close all; clc;
c=2020;
h = waitbar(0,'Please wait...');
for a=1:c
    waitbar(a/c, h)
    for b=a:c
        if a^2+b^2+1116^2-c^2==0,
            fprintf('a=%i; b=%i; c=%i \n',a,b,c)
        end
    end
end
delete(h);
fprintf('=====PROGRAM FINISHED!!!=====\\n')
```



$$112^2 + 1680^2 = 2020^2 - 1116^2$$

Mock-Up, Q9: Entering Answer & Script

YOUR TASK-9 ANSWER: *

2 points

IF the task has several solutions (i.e. "a and b" pairs), enter only solution value for 'a' with the SMALLEST value of "a" out of the solution pairs found. If you DO NOT KNOW how to solve the task, enter 999.

112

SUBMIT YOUR MATLAB SCRIPT FOR Task-9 AS ONE (SINGLE) FILE INTO THE WINDOW BELOW, using 'cut-and-paste' method, cutting the script from your *.M file. The first line should have: double percentage, space, and your student number with 's', similar to the pattern '%% s3456789' *

(In case you were not able to complete the script, enter a line with your student number, similar to the pattern: '%% s3456789 Task NOT COMPLETED')

```
% MOCK-UP Q9: Programmed by Prof P.M.Trivailo © 2020 COMPACT VERSION
clear; close all; clc; c=2020;
for a=1:c, for b=a:c, if a^2+b^2+1116^2-c^2==0, fprintf('a=%i; b=%i; c=%i \n',a,b,c)
end, end, end
```

SOLVING MOCK-UP QUESTIONS: Q10

1. TASK ITSELF with ILLUSTRATION FIGURE

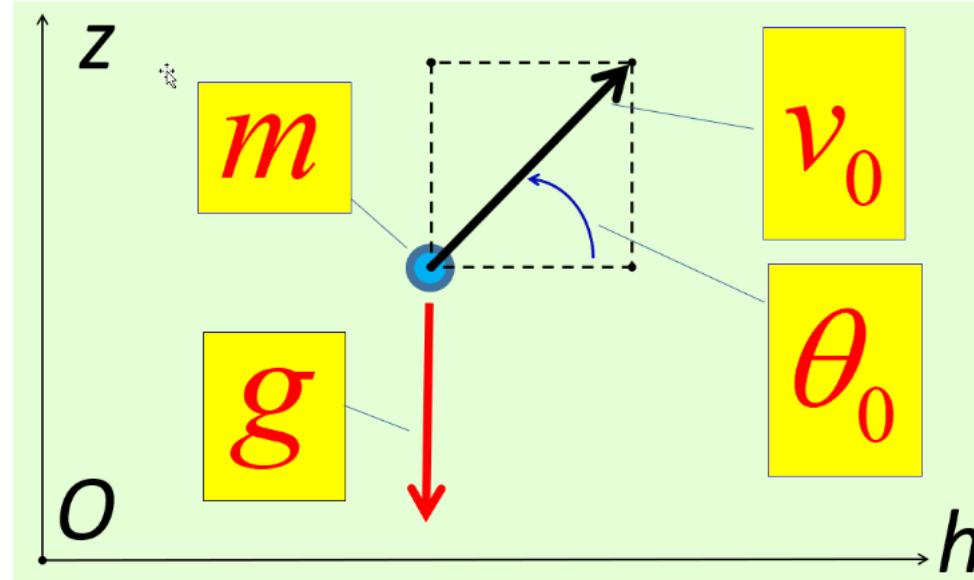
TASK-10 (Cartesian Coordinates. Curvilinear motion: Normal & Tangential Coordinates)

Projectile of mass $m=1$ kg is launched with initial velocity $v=12$ m/s and at angle $\theta = 30$ degrees, as per the Figure below.

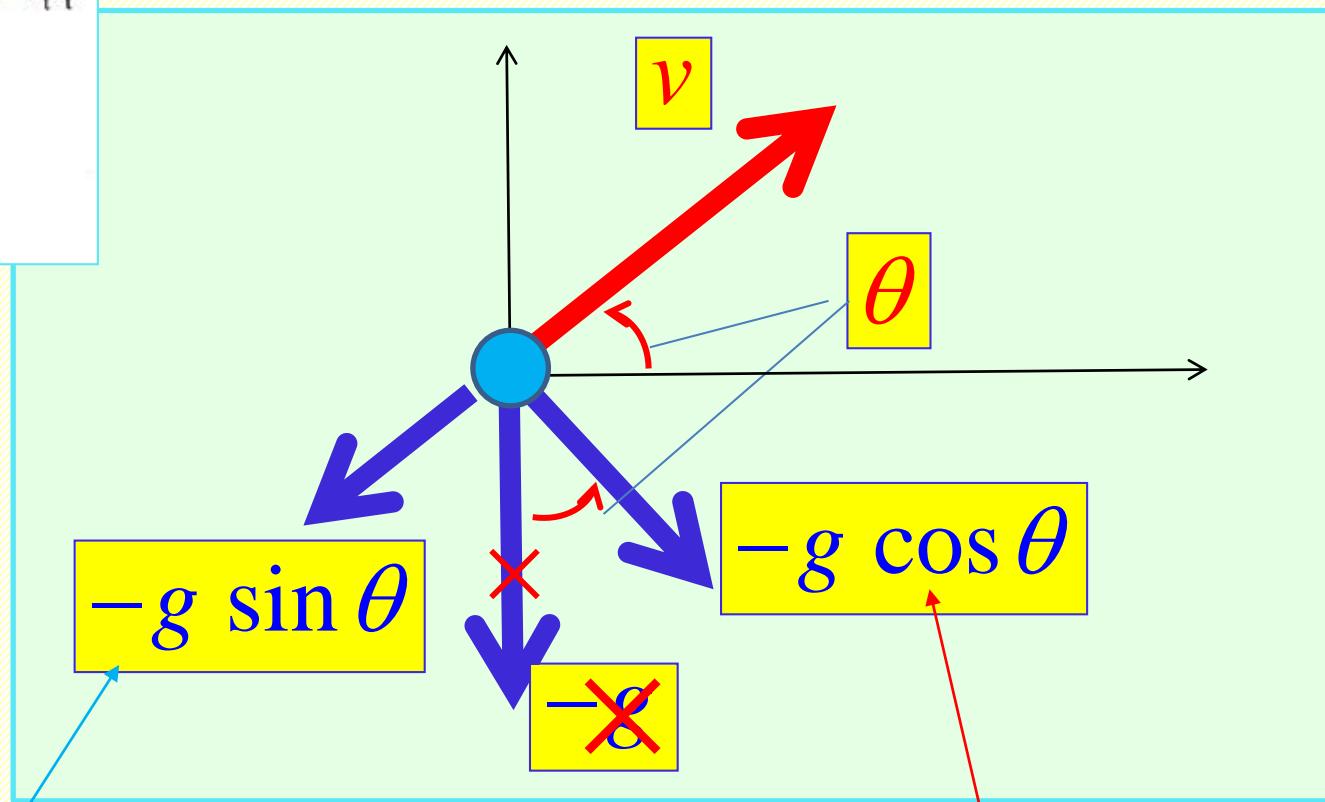
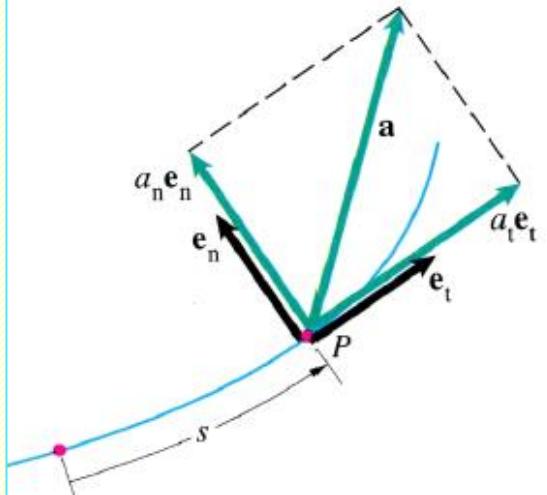
For this instant CALCULATE the radius of curvature R of the path (also often called as instantaneous radius of rotation).

Assume, that the only force, acting on the projectile (at the initial instant shown), is the gravitational force of the Earth with its gravitational acceleration $g=9.81$ m/s².

Figure-10: Projectile mass "m", launched with initial velocity "v" at angle "theta".



Hint for Assignment-1: ρ



Contributes to
tangential acceleration

$$a_t = dv/dt$$

Contributes to
normal acceleration

$$|a_n| = v^2/\rho$$

SOLVING MOCK-UP QUESTIONS: Q10

Mock-Up, Q10: Entering Answer & Script

PLEASE, READ ADDITIONAL RECOMMENDATIONS AND ENTER YOUR ANSWER for TASK-10 BELOW: *

Round your result up to the whole (integer) value and select the choice (in the multiple choice answer fields below), most closely matching your numerical answer.

Note: Your correct answer may be discounted if you do not submit a properly working MATLAB script, producing correct answer.

- 173 m
- 2939 m
- 17 m
- 7 m
- None of the above

2 points

$$\frac{v^2}{\rho} = |g \cos \theta|$$

$$\rho = \frac{v^2}{|g \cos \theta|} = \frac{12^2}{9.81 \times \cos 30^\circ} \approx 17 \text{ (m)}$$

SUBMIT YOUR MATLAB SCRIPT FOR Task-10 AS ONE (SINGLE) FILE INTO THE WINDOW BELOW, using 'cut-and-paste' method, cutting the script from your *.M file. The first line should have: double percentage, space, and your student number with 's', similar to the pattern '%% s3456789' *

(In case you were not able to complete the script, enter a line with your student number, similar to the pattern: %% s3456789 Task NOT COMPLETED)

%% MOCK-UP Q10: Programmed by Prof P.M.Trivailo © 2020
12^2/(9.81*cosd(30))

Command Window

New to MATLAB? See resources for [Getting Started](#).

```
>> 12^2 / (9.81*cosd(30))
```

ans =

16.9497

MATERIALS ON STUDENTS REQUEST

**END
of Tutorial-2 (Wk-5)**