A04 · MATLAB Calculations

Introduction

Assignment Goals

This assignment allows you to practice using MATLAB documentation to discover built-in functions and perform calculations on any array type. You will execute commands inside the MATLAB Command Window, store variables in the Workspace, and learn how to use various built-in functions.

Successful Completion

This assignment has two (**2**) problems.

1. Read *Notes Before You Start*, on **Page 1**.
2. Read each problem carefully. You are responsible for following all instructions within each problem.
    a. The deliverables list within each problem contains everything you are expected to submit.
    b. You will need the problem generator **A04_skills.p** for all problems.
3. Review your work using the learning objective evidences.
4. When your work is complete, confirm your deliverables are submitted to Gradescope.
5. Late submissions will be accepted up to 24 hours after the due date and will result in a 25% penalty.

Learning Objectives & Grading

This course uses learning objectives (LOs) to assess your work. You can find a full list of the course LOs here. Review the grading outline at the end of each problem in this assignment to see each problem's LOs.

Notes Before You Start

Problem Generator File (A04_skills.p)

In the assignment folder, you will see a file named **A04_skills.p**. This is a MATLAB function file that generates problem information for each skill problem in this assignment. Need help? See this link to view instructions or review the A00 Activity from Class 1B to see fully-worked examples.

Gradescope

You will submit all your deliverables to Gradescope for grading. View the Gradescope help for online assignments if you need assistance with submitting your work.

Accessing Gradescope for the first time in ENGR 132?

1. Log into Brightspace and open your ENGR 132 course.
2. Click **Content** from the black menu ribbon at the top of the page.
3. Click **Gradescope** from the Table of Contents in the left sidebar.
4. Click the top item, which is a link that will open your section's Gradescope course.
5. Select the assignment you are ready to submit.

Opening Gradescope through Brightspace will auto-enroll you in the Gradescope course for your section.

You can access Gradescope through Brightspace throughout the semester.

Problem 1: Built-in Function Skills

Introduction

This problem has 6 questions that will test your knowledge of MATLAB's built-in functions. You will use MATLAB's Command Window and help documentation to search for functions that meet a specified need. You will use some of those functions to write MATLAB commands.

Problem Generator Information

If you have questions about how to use the problem generator, review this link that shows step-by-step instructions.

File Name	PUID	Problem Number
A04_skills	Your 8-digit PUID (leave off the leading 00)	1.1 1.2 1.3 1.4 1.5 1.6

You will run the problem generator 6 times in this problem, once per question.

Submission

Gradescope Assignment	A04 – All Problems
Problem Type	Individual
Deliverables	☐ Requested information and solutions

Problem

1. Enter the function call for question 1.1 into the MATLAB Command Window prompt. This will generate the instruction text.
2. Read the instruction text that appears in the Command Window.
3. Solve the problem presented in the instruction text. Use MATLAB's help documentation to find any built-in commands needed to answer the question.
4. Submit your **instruction text with run receipt** and **solutions** to Gradescope. Follow any extra instructions that appear in Gradescope.
5. Save your work. See this video for help (this is an untimed assignment).
6. Repeat steps 1-5 for questions 1.2, 1.3, 1.4, 1.5, and 1.6.

Hints and Troubleshooting

- You can resubmit to Gradescope as many times as you need. Only your final submission is graded.
- When you are given a vector or matrix in the instruction text, you can enter the array into your MATLAB Workspace by copying and pasting the array, with its variable name, into the Command Window at the >> prompt.
- If you cannot copy-paste into Gradescope, then you may need to refresh or update your browser. Use Google to find a solution for your specific browser.

Grading

LOs: PC05, MAT03

Point value: 9 points, where each question is 1.5 point. There is some partial credit on Questions Q1.1 – 1.5. The partial credit may be more specific than what is in the course LOs and is based on evidence MAT03 (1).

You must meet the PC05 expectations for each question. If you do not meet these, you will lose additional credit.

Evidence	Penalty
PC05 (1)	Lose full credit on question
PC05 (2)	Lose 25% of full credit on question
PC05 (3)	Lose 25% of full credit on question
PC05 (8)	Lose 10% of full credit on question

Problem 2: Calculation Skills

Introduction

Element-wise operations are powerful and useful mathematical commands within MATLAB. They make your code more efficient and save you time as a programmer. An element-wise operation occurs when each element in one array performs the stated operation with ***only*** its counterpart in the next array. The terms *array operations*, *element-wise operations*, and *element-by-element operations* all mean the same thing in MATLAB and course documentation.

You will demonstrate the difference between scalar operations and element-wise operations in this problem by solving mathematical equations that require both operations.

Problem Generator Information

If you have questions about how to use the problem generator, review this link that shows step-by-step instructions.

File Name	PUID	Problem Number
A04_skills	Your 8-digit PUID (leave off the leading 00)	2

Submission

Gradescope Assignment	A04 – All Problems
Problem Type	Individual
Deliverables	☐ Requested information and solutions ☐ Instruction image file: A04Q2_instructions_*login*.png

Problem

This problem has two parts. Solve an equation with scalars in Part A, then solve an equation with vectors in Part B.

1. Enter the problem generator function call into the MATLAB Command Window prompt. This will generate the instruction text and an instruction figure that displays the two equations.
    a. Resize the figure window if necessary to see the full equations. See this video for help.
2. Save the instruction figure as a PNG file with the full equations visible. See this video for help.

   a. Use the name format given in the submission deliverables list. Note: *login* is your Purdue career account login. Use a proper file type (i.e., PNG) so your image will display in Gradescope.

3. Read the written instruction text that appears in the Command Window for both parts. Examine the equations for each part in the figure window. For each part:
   a. Add the variables from the instruction text to your Workspace.
   b. Perform each calculation using the variable names; do not hardcode any variable's numeric values into the expression.
   c. Do not change the order of the equation terms or attempt to simplify the equation before doing the calculation.
4. Submit your **instruction text with run receipt**, **image** file with the equations, and **solutions** into Gradescope. Follow any extra instructions that appear in Gradescope.
5. Save your work. See this video for help (this is an untimed assignment).

Hints and Troubleshooting

- You can resubmit to Gradescope as many times as you need. Only your final submission is graded.
- When you are given a vector or matrix in the instruction text, you can enter the array into your MATLAB Workspace by copying and pasting the array, with its variable name, into the Command Window at the >> prompt.
- If you cannot copy-paste into Gradescope, then you may need to refresh or update your browser. Use Google to find a solution for your specific browser.
- Review your submission to make sure that all image files display properly. If you cannot see the image in Gradescope after you submit, then neither can the grader.

Grading

LOs: PC05, MAT03

Point value: 6 points, where each part is worth 3 points. There is some partial credit on each part. The partial credit may be more specific than what is in the course LOs and is based on evidences MAT03 (1) – (4).

You must meet the PC05 expectations for this problem. If you do not meet these, you will lose additional credit.

Evidence	Penalty
PC05 (1)	Lose full credit on problem
PC05 (2)	Lose 25% of full credit on problem
PC05 (3)	Lose 25% of full credit on problem
PC05 (4)	Lose 10% of full credit on problem
PC05 (8)	Lose 10% of full credit on problem