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Programming 6 Homework - Files and Matrices

READ THE FOLLOWING VERY CAREFULLY

- Pseudocode or flowchart.
  - Handwritten flowcharts are acceptable if legible
    - If not, use a word or drawing program to assist
  - Pseudocode must be typed
  - Must adhere to the course syntax
    - Pseudocode is not just your code in a text file
- This is not a group assignment. It is an INDIVIDUAL one.
  - But I do understand if you work together.
  - You must turn in your own code
  - You must acknowledge who helped you in the Title block.
    - If it was another student, name them.
    - If it was a Red Shirt, just say Red Shirts and their first name if you can recall it. The same goes for if you get help from the TA.
- INCLUDE comments in your code
  - Code is not complete if it is not annotated to help us understand what you are trying to do in your code.
  - Basic rule of thumb is you need enough so that someone with a similar ability level could just look at the comments and fully understand what you're trying to do with your code without having to interpret your actions through the code itself.

Most importantly, the input files provided for all your assignments will not be the input files the TA uses. The size of the data set they use to check your work will be different but your program should still function. You must create your program to be capable of taking any size data file, similarly created for the purpose of that part, and meet the assignment requirements.

P6H1 – Photonics Mast Window Tests

Photonics masts have specialized windows that protect the camera

equipment from the caustic effects of the ocean as well as the physical toll of sub-surface travel and naval dangers. They are formed as a single crystal in a mold to provide the strongest barrier while also providing an optically clear viewport for the cameras. They protect some very expensive equipment and serve a very specific optical purpose so they go through some rigorous testing to ensure they can take the pressures and temperatures at depth as well as in an emergency situation. If they crack or warp, they are rejected.

The testing takes place in a pressurized chamber. It is designed to control the water temperature and pressure inside to mimic the extremes that the submarine will endure. The chamber will also quickly discharge the pressure inside to simulate a pressure shockwave. For the testing to be a success, the temperature, pressure, and discharge time must be within a specific range.

The acceptable ranges for these three conditions are as follows:

- Temperature: 8-12° C
- Pressure: 1000-1200 psi
- Discharge Time: 1.00-2.25 sec

After the latest production run, you had a significant number of failed windows. You have been tasked to analyze these failures. You notice that some of the test conditions were outside of specification. You need to determine exactly how many to see if its significant and if the issue is with the testing equipment. Write a program that reads in a file containing data on the failed windows. Each line of the file contains: a part number and the temperature, pressure and discharge time for that part.

Assignment Requirements:

As the Quality Control Engineer, you need to analyze the data and compute:

1. Number of irregular tests due to:
    1. Temperature
    2. Pressure
    3. Discharge Time
2. Percent of irregular tests due to

1. Temperature
2. Pressure
3. Discharge Time
3. Total number and Percent of irregular tests.

You must also create a pseudocode or flowchart to showcase the logic of your program.

If a specific test was irregular due to more than one category, it should be counted in all of the applicable totals of 1 and 2. Any out of specification issue counts as an invalidation of the test.

However, **do not 'double count' invalidated tests**, if a test has more than one issue. The total number and percent of irregular tests should only reflect each irregular test once, regardless if it failed due to temperature, pressure, discharge time, or some combination of the three.

INPUT FILE: TestConditions.txt

The file is available on Top Hat for direct download or you can "save as..." from this link:

https://github.com/boconn7782/CourseCode/raw/main/MATLAB/TestConditions.txt

The TA's input file will always have 4 columns in the same order as this but the number of rows is unknown to you. It will have the same name though.

Example Output:

(Without a descriptive program introduction)

```
********** Window Tests Check *************
Number of irregular tests due to...
    Temperature: 12
    Pressure: 11
    Discharge time: 10
Percent of irregular tests due to...
    Temperature: 12.00%
    Pressure: 11.00%
    Discharge time: 10.00%
Total number of irregular tests: 15
Percent of irregular tests: 15.00%
```

This example uses fake numbers just to showcase that the total is not necessarily the sum of the number of failed batches by each of the criteria. If a test fails multiple criteria, they should add to the count of each of those criteria but it should only count once to the total number, not count once for each failure criteria. Your output does not have to exactly match the user interface but it should output the same information. Your numbers will be different.

Your output does not have to perfectly match this output as long as the required information is there and clearly provided.

For Extra Credit:

- Track the Part Number of the failed test by each category
- Print the failed batch Part Numbers to the screen in rows of 7

```
********* Window Tests Check — Extra Credit ***************
Number of irregular tests due to...
    Temperature: 12
    Pressure: 11
    Discharge time: 10
Percent of irregular tests due to...
    Temperature: 12.00 %
    Pressure: 11.00 %
    Discharge time: 10.00 %
Total number of irregular tests: 15
Percent of irregular tests: 15.00 %
Parts with irregular tests due to temperature:
    001 002 003 004 005 006 007
    008 009 010 011 012
Parts with irregular tests due to pressure:
    001 002 003 005 006 007 009
    011 012 013 014
Parts with irregular tests due to discharge time:
    001 002 003 005 006 007 008
    009 011 014 015
```

This example uses fake numbers for the results and the part numbers as well

Your output does not have to perfectly match this output as long as the required information is there and clearly provided
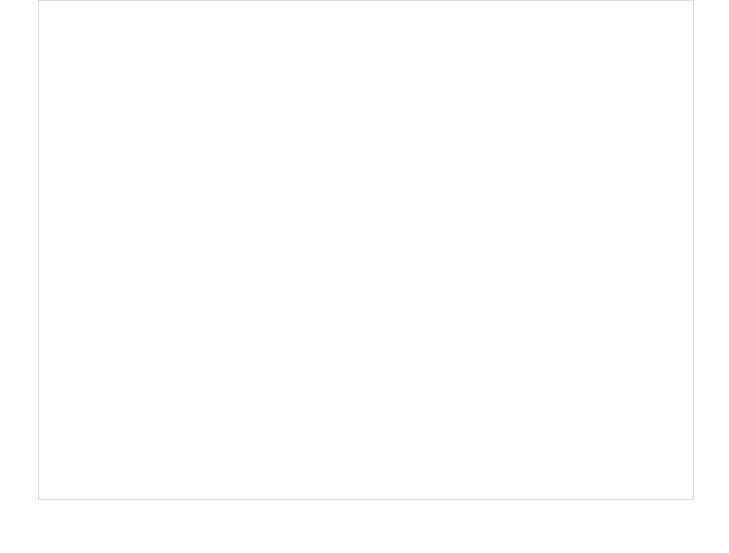
Submission Requirements:

- MATLAB Script - .m file
- Write up - PDF
    - Pseudocode or Flowchart of your program
    - Copy of the MATLAB code
    - Copy of the Command Window output for a run of your script

Extra Credit

The extra credit submission will count for all other requirements, if it works. Use the standard naming convention for your files. You must include 'Extra credit' in the title block of the code and in the command window output though to inform the TA that your submission claims to meet the extra credit requirements.

You may submit a standard version along with your extra credit version if you're worried about not getting credit for the standard requirements. If you do so, please also add '_EC' to the end of the filenames for the extra credit.

The following survey is for my reference to help improve future assignments. The results are not checked until after the semester is completed and participation is not required.

Rubric

P6H1: Optronic Mast Window Tests

- Pseudocode/Flowchart - 30%
  - Logical Approach to problem
  - Well communicated/written
- Programming - 50%
  - Runs without errors
  - Appropriate Commands
  - Clean and clear UI
  - Commented throughout and cleanly
- Output - 20%
  - Clean and Clear UI
  - Identifies number/percent of failed batches per criteria
  - Identifies total number/percent of failed batches
- For Extra Credit - 5%