

ENGR 1120 – Programming for Engineers (MATLAB)

Laboratory 4 – Formatted Output

Objectives: Demonstrate ability to produce a specified table of output. Demonstrate ability to convert a flowchart into a working MATLAB script file.

Exercise A

Data for several moons orbiting several different planets in our solar system is stored in the file L:\engr1120\MATLAB\Craven\moons.mat. Use the formulas from Laboratory #3 to evaluate the lunar characteristics for all moons in the data file. Assume that all of the units are consistent with those from Laboratory #3. NOTE that the equations may need to be modified slightly to accommodate different vector variables, if applicable. Also, modify the output so that a table is produced using the **exact format** defined below, there are 5 spaces between columns.

Lunar Radius (m)	Angular Velocity (rad/sec)	Period (days)
-----	-----	-----
#.###e+##	#.###e+##	###.##

Exercise B

The flowchart on the following page describes a program that will begin by defining a vector of temperature values, given in Fahrenheit. The program then converts these temperatures into the other units commonly used for temperature: Celsius, Kelvin, and Rankine. The output from this program is to be a table showing the input temperature values and the corresponding converted temperature values, in columns. You are to convert this flowchart into a MATLAB script M-file. The output table is to be properly labeled and have values that are appropriately aligned.

Test your program with various types of temperature vectors. For example, try using:

- one scalar input value
- a row vector of evenly spaced values (using the colon operator)
- a row vector of evenly spaced values (using the linspace function)
- a row vector of random values
- a column vector of random values (what would need to be changed in your script file?)

SUBMIT: Turn in a copy of the script file and a copy of the example output for **Exercise B only**. For the example output you are to use at least 5 temperature values that include 0, 32, & 212 °F.

START

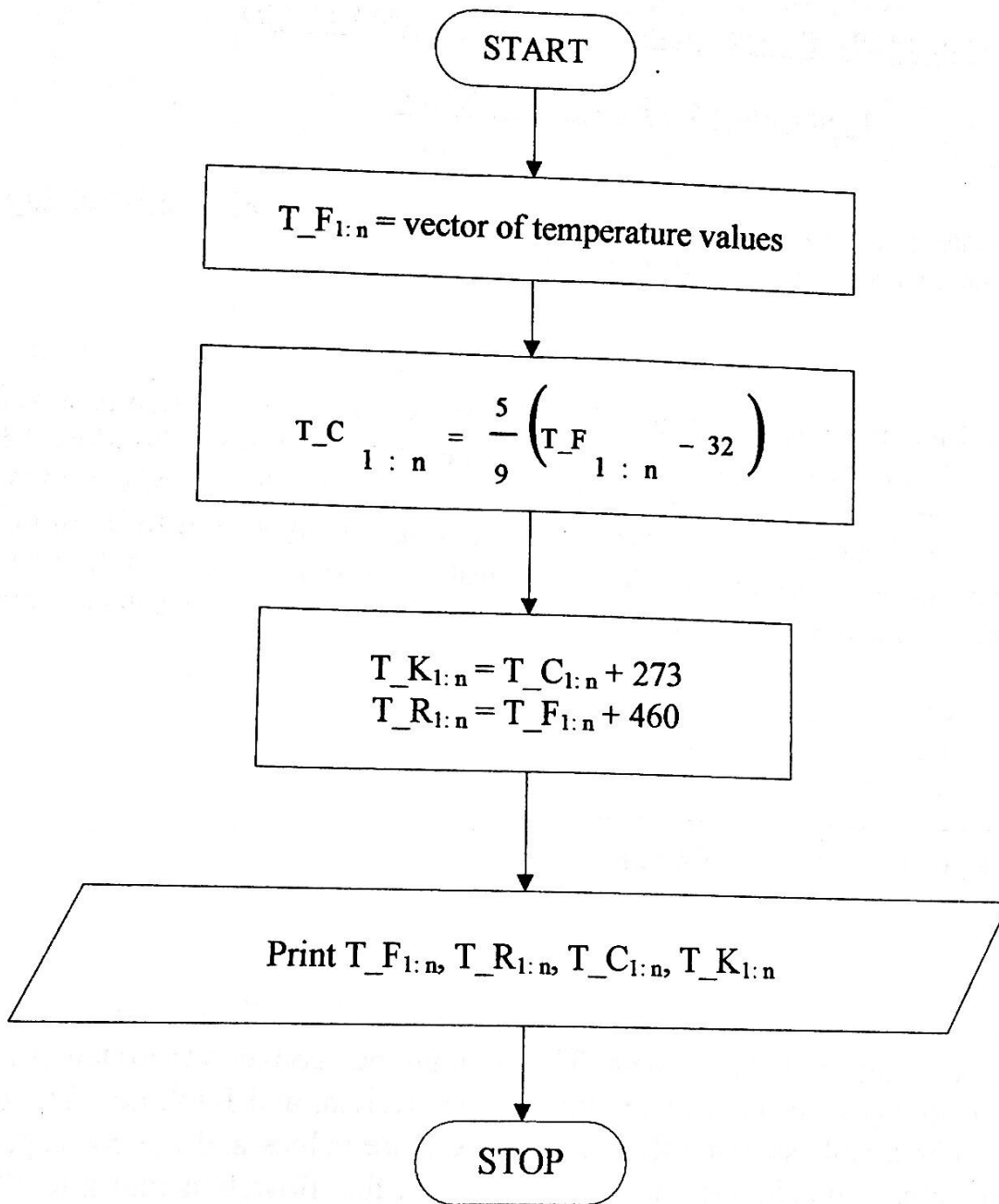
$T_{F_{1:n}}$ = vector of temperature values

$$T_{C_{1:n}} = \frac{5}{9} (T_{F_{1:n}} - 32)$$

$$\begin{aligned} T_{K_{1:n}} &= T_{C_{1:n}} + 273 \\ T_{R_{1:n}} &= T_{F_{1:n}} + 460 \end{aligned}$$

Print $T_{F_{1:n}}$, $T_{R_{1:n}}$, $T_{C_{1:n}}$, $T_{K_{1:n}}$

STOP



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Program Documentation Requirements

All programs/m-files submitted for grading must include at least the following documentation.

Heading:

Name

Class – including Section #

Date

Program Description – a brief (one or more sentences) that describe what the program does

Other Documentation:

Other comments within the program as needed to explain the program operation. Not too few and not too many.