ME 1020 Engineering Programming with MATLAB

Problem 3.7:

7.* When a belt is wrapped around a cylinder, the relation between the belt forces on each side of the cylinder is

$$F_1 = F_2 e^{\mu\beta}$$

where β is the angle of wrap of the belt and μ is the friction coefficient. Write a script file that first prompts a user to specify β, μ, and F_2 and then computes the force F_1. Test your program with the values β = 130°, μ = 0.3, and F_2 = 100 N. (*Hint*: Be careful with β!)

The hint indicates that beta must be in radians!

Search for the **input** command:

input

Request user input

Syntax

```
evalResponse = input(prompt)
strResponse = input(prompt, 's')
```

Description

`evalResponse = input(prompt)` displays the `prompt` string on the screen, waits for input from the keyboard, evaluates any expressions in the input, and returns the value in `evalResponse`. To evaluate expressions, the `input` function accesses variables in the current workspace.

`strResponse = input(prompt, 's')` returns the entered text as a MATLAB string, without evaluating expressions.

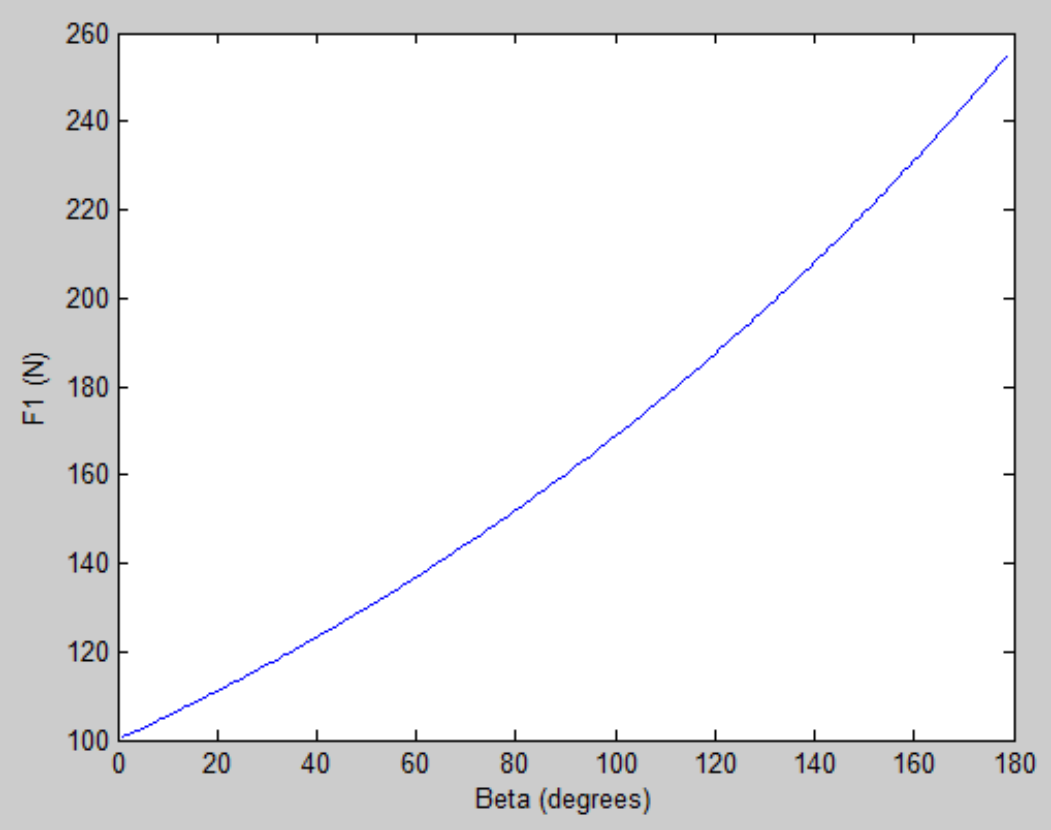
Examples

Request a text response. Assign a default value (`'Y'`) by checking for an empty matrix.

```
reply = input('Do you want more? Y/N [Y]: ', 's');
if isempty(reply)
    reply = 'Y';
end
```

```
1      % Problem 3.7
2 -    clear
3 -    clc
4 -    disp('Problem 3.7: Scott Thomas')
5
6 -    F2 = input('F2 = ')
7 -    Mu = input('Mu = ')
8 -    Beta_degrees = input('Beta (degrees) = ')
9 -    Beta_radians = Beta_degrees*pi/180
10
11 -   F1 = F2*exp(Mu*Beta_radians)
12
13     % Generate a plot
14
15 -   beta_degrees = 1:179;
16 -   beta_radians = beta_degrees*pi/180;
17 -   F1plot = F2*exp(Mu*beta_radians);
18 -   plot(beta_degrees,F1plot),xlabel('Beta (degrees)'),ylabel('F1 (N)')
19
```

```
Problem 3.7: Scott Thomas
F2 = 100

F2 =

   100

Mu = .3

Mu =

    0.3000

Beta (degrees) = 130

Beta_degrees =

   130


Beta_radians =

    2.2689


F1 =

  197.5217

fx >>
```


260
240
220
200
180
160
140
120
100
F1 (N)
0
20
40
60
80
100
120
140
160
180
Beta (degrees)