19-Conditional Statements Part 2

text: Chapter 6.2-6.3

ECEGR 101

Engineering Problem Solving with Matlab

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Overview

- Switch Statements
- Case sensitivity
- Menus

The switch-case Statement

- Used for testing whether an expression is equal to a number of different values.
- Syntax: switch expression

```
        case value1
                statement group 1
        case value2
                statement group 2
        …
        case valueN
                statement group N
        otherwise
                statement group N+1
end
```

Example

Create a program that asks the user to input two numbers, x and y, and either adds x to y, subtracts y from x or multiplies x and y based upon user input.

Example

```
x = input('Enter x: ');
y = input('Enter y: ');
operation = input('Enter operation: ');

switch(operation)
    case('add')
        x+y
    case('subtract')
        x-y
    case('multiply')
        x*y
    otherwise
        disp('error: unknown operation')
end
```

Command Window

```
Enter x: 5
Enter y: 2
Enter operation: 'add'
ans =
     7
```

Command Window

```
Enter x: 5
Enter y: 2
Enter operation: 'subtract'
ans =
     3
```

Command Window

```
Enter x: 5
Enter y: 2
Enter operation: 'multiply'
ans =
    10
```

Switch is case sensitive →

Command Window

```
Enter x: 5
Enter y: 2
Enter operation: 'Add'
error: unknown operation
```

Exercise

Use the switch statement to take the sine, cosine or tangent of an angle where the user enters the angle and the operation.

The user should enter:

1 for sine

2 for cosine

3 for tangent

Exercise

```
angle = input('enter the angle in radians: ');
f = input('enter 1 for sine, 2 for cosine, 3 for tangent: ')

switch f
    case 1
        y = sin(angle)
    case 2
        y = cos(angle)
    case 3
        y = tan(angle)
    otherwise
        disp('incorrect selection')
end
```

Switch

- Usually want the switching to be case-insensitive

R = input('What is your name','s')

gives the prompt in the text string and waits for character string input. The typed input is not evaluated; the characters are simply returned as a MATLAB string.

B = lower(A)

converts any uppercase characters in A to the corresponding lowercase character and leaves all other characters unchanged.

Exercise

```
x = input('Enter x: ');
y = input('Enter y: ');
operation = input('Enter operation: ', 's');
operation = lower(operation);
switch(operation)
    case('add')
        x+y
    case('subtract')
        x*y
    case('multiply')
        x*y
    otherwise
        disp('error: unknown operation')
end
```

Command Window

```
Enter x: 5
Enter y: 2
Enter operation: Add

ans =

     7
```

No need for ‘ ’ and no longer case-sensitive

The menu function

The built-in *menu* function displays a graphical menu for the user. For example:

```
choice = menu('make a choice', 'steak', 'chicken', 'tofu');
```

Header item#1 item#2 item#3

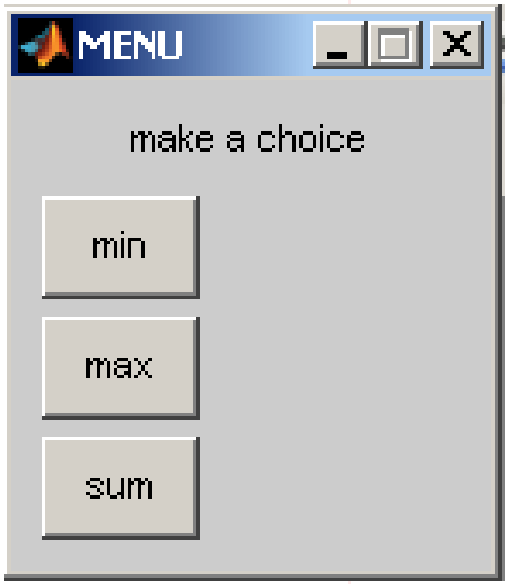
Returns the number of the selected menu-item

In this example, it returns 1, 2 or 3

Example

```
clear all;
x = input('enter input vector  ');
response = menu('make a choice', 'min', 'max', 'sum');

switch response
    case 1
        y = min(x);
    case 2
        y = max(x);
    case 3
        y = sum(x);
end
```



Exercise

Write a script that prompts the user with a menu for one of four trigonometric functions: sine, cosine, tangent, and cotangent. The user selects a number from the menu, and the script then plots the selected function from –pi to pi in increments of 0.01. Use the *switch* command to make the selection.

Exercise

Use the following commands to plot the tangent function:

```
x1 = -pi+0.01:0.01:(-pi/2)-0.01;
x2 = (-pi/2)+0.01:0.01:(pi/2)-0.01;
x3 = (pi/2)+0.01:0.01:pi-0.01;
plot(x1,tan(x1), x2,tan(x2), x3,tan(x3)),
```

and the following commands to plot the cotangent function:

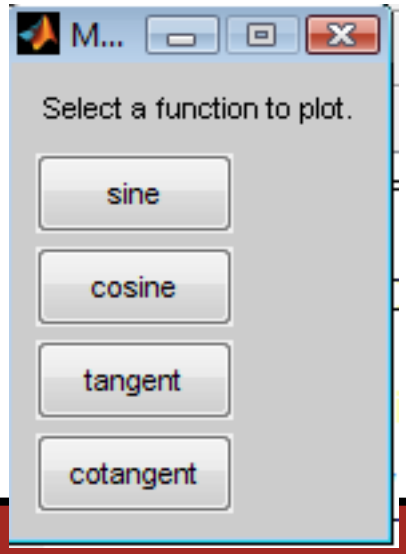
```
x1 = -pi+0.01:0.01:-0.01;
x2 = 0.01:0.01:pi-0.01;
plot(x1,cot(x1),x2,cot(x2)).
```

Exercise

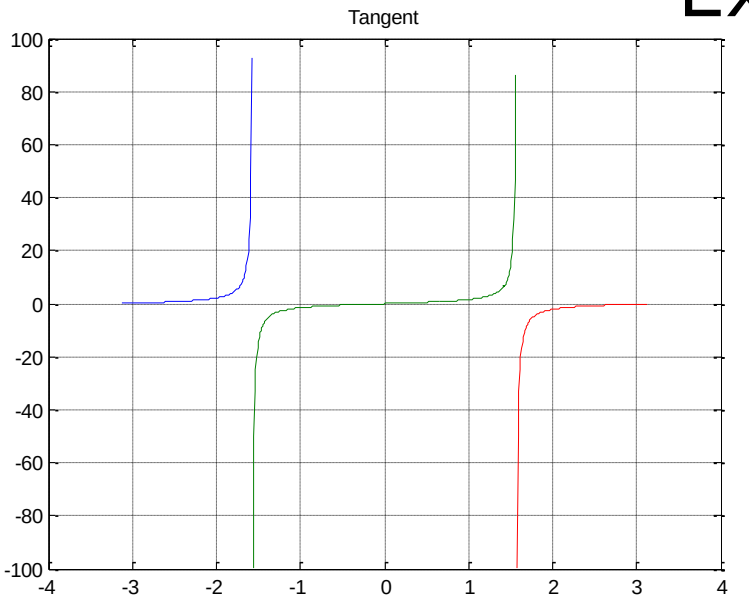
```
userChoice = menu('Select a function to plot.', 'sine', 'cosine',
    'tangent', 'cotangent');
figure(1)
switch userChoice
    case 1
        x = -pi:0.01:pi;
        plot(x, sin(x));
        axis([-pi pi -1 1])
        grid on
        title('Sine')
    case 2
        x = -pi:0.01:pi;
        plot(x, cos(x));
        axis([-pi pi -1 1])
        grid on
        title('Cosine')
```

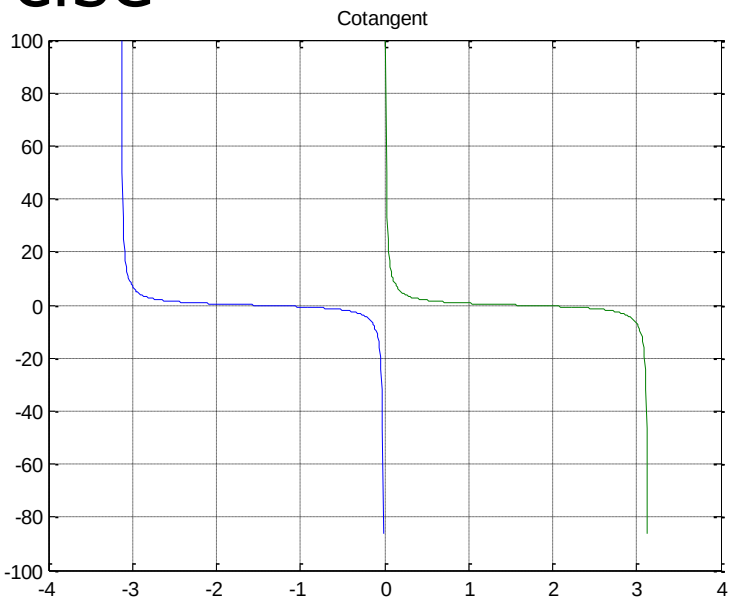
Exercise

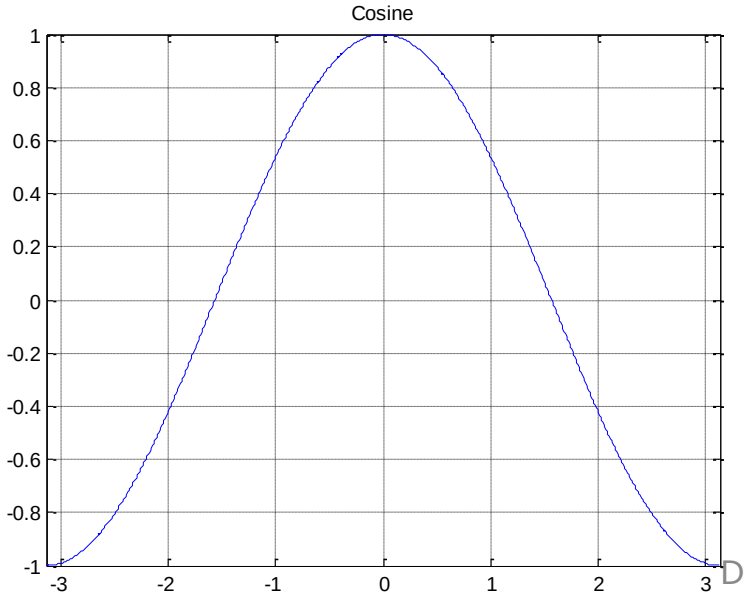
```
case 3
        x1 = -pi+0.01:0.01:(-pi/2)-0.01;
        x2 = (-pi/2)+0.01:0.01:(pi/2)-0.01;
        x3 = (pi/2)+0.01:0.01:pi-0.01;
        plot(x1,tan(x1), x2,tan(x2), x3,tan(x3)),
        grid on
        title('Tangent')
    case 4
        x1 = -pi+0.01:0.01:-0.01;
        x2 = 0.01:0.01:pi-0.01;
        plot(x1,cot(x1),x2,cot(x2))
        grid on
        title('Cotangent')
end
```

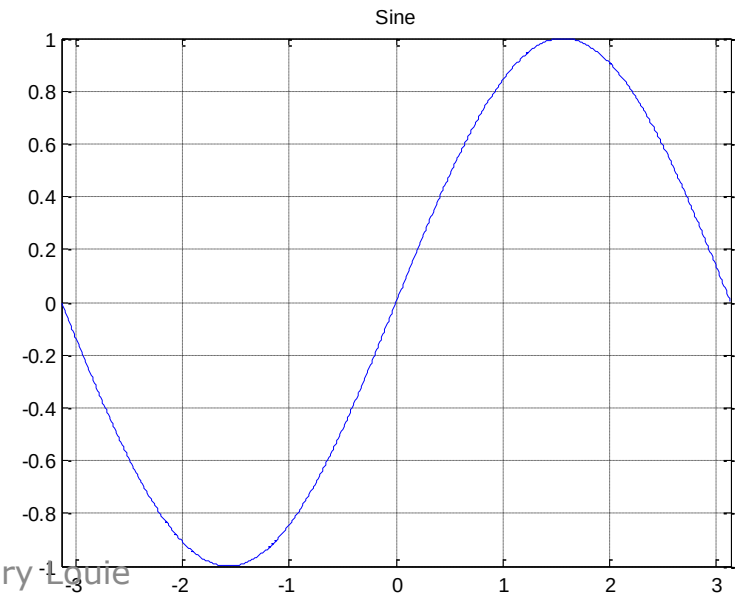


Exercise


Tangent
100
80
60
40
20
0
-20
-40
-60
-80
-100
-4
-3
-2
-1
0
1
2
3
4


Cotangent
100
80
60
40
20
0
-20
-40
-60
-80
-100
-4
-3
-2
-1
0
1
2
3
4


Cosine
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-3
-2
-1
0
1
2
3


Sine
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-3
-2
-1
0
1
2
3

Exercise

The following table gives the approximate values of the static coefficient of friction μ for various materials.

Materials	μ
Metal on metal	0.20
Wood on wood	0.35
Metal on wood	0.40
Rubber on concrete	0.70

Exercise

To start a weight W moving on a horizontal surface, you must push it with a force F, where F = μW. Write a MATLAB program that uses the switch structure to compute the force F.

The function should ask the user for the value of W and the type of materials.

Exercise

```
W=input('Input Weight :');
material=input('Input Material ID Number \n 1: Metal on Metal\n 2: Wood on Wood \n 3: Metal on Wood \n 4: Rubber on Concrete\n');
switch material
    case 1
        mu=0.2;
    case 2
        mu=0.35;
    case 3
        mu=.04;
    case 4
        mu=0.70;
    otherwise('wrong material number')
        mu=inf;%%a value that does not make sense
end
F=mu*W
```

Command Window

```
Input Weight :100
Input Material ID Number
 1: Metal on Metal
 2: Wood on Wood
 3: Metal on Wood
 4: Rubber on Concrete
2

F =

    35
```