

WESTERN SYDNEY
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Module 5

Conditional Statements

Uses of the if-end construct

- The **if-end** decision construct is useful when relational operations are used to decide whether or not to execute a sequence of commands.
 - You can use them for displaying messages.
 - You can use them to prevent undesired operations, e.g., you may wish to skip the `log(x)` command for $x \leq 0$. (*Of course, since MATLAB deals with complex numbers, the log of a negative number is a legitimate mathematical operation.*)

Basic if-end construct

- The basic if-end construct has the form:

```
if comparison
  action
end
```

- The two main keywords are **if** and **end**
- When the comparison is true, it moves on to the action.
- When the comparison is false, the program skips to the end statement.

Example 1

```
if b^2-4*a*c > 0
    x1 = -(b + sqrt(b^2 - 4*a*c)) / (2*a)
    x2 = -(b - sqrt(b^2 - 4*a*c)) / (2*a)
end
```

if-end constructs with arrays

- When the comparison includes an array, all elements are compared. An **if** construct requires all elements to be true.

```
g = 0:10:80;  
if g < 50  
    fprintf('g is less than 50.\n');  
end
```

- Since some elements of *g* are greater than 50 the statement is false so it skips to end. There is no output.

elseif

- The `elseif` keyword is an optional keyword
- `elseif` is useful when you have multiple comparisons to test.

```
if grade>=85
    fprintf('HD\n');
elseif grade>=75
    fprintf('D\n');
elseif grade>=65
    fprintf('C\n');
elseif grade>=50
    fprintf('P\n');
elseif grade<50
    fprintf('F\n');
end
```

Note that the first `elseif` statement that is true will be executed and the other `elseif` statements are ignored

else

- The **else** command is an optional keyword in an **if-end** construct. When the **if** comparison is false, commands after **else** are executed.
- There may only be one **else** keyword

```
x = input('What is the number?');  
if x > 0;  
    y=log(x)  
else  
    beep  
    fprintf('Error log of negative or zero.\n')  
end
```

Switch-case keywords

- There are four keywords for the switch-case construct
 - `switch`
 - `case`
 - `otherwise`
 - `end`
- `switch` is followed by switch expression/variable which may be a user choice. Switch expression **must be scalar number or string**
- `case` allows you to add statements based on a choice
- `otherwise` is an optional keyword and functions like the `else` keyword in an the `if-end` structure

The structure of switch/case

```
switch variable/switch expression
case option1
    code to be executed if variable is exactly
    equal to option 1
case option2
    code to be executed if variable is exactly
    equal to option 2
case option_n
    code to be executed if variable is exactly
    equal to option n
otherwise
    code to be executed if variable is not
    equal to any of the options
end
```

Switch-case construct

- This structure is an decision construct that is alternative to the if-end structure
- The code is generally easier to read
- This structure allows you to choose between multiple outcomes, based on some criterion, which must be exactly true

When to use switch/case

- The criterion can be either a scalar (a number), a string or a character
- In practice, it is used more with strings than with numbers.

Example

- Suppose you want to determine what the fuel price is
- The available fuel types for cars

Fuel Type	Code
Ethanol 94	E94
Ethanol 105	E105
Unleaded 91	U91
Premium 95	U95
Premium 98	U98
Diesel	DL
Premium Diesel	PDL

if-end approach

```
code = input('Enter fuel type code :','s')
if strcmp(code,'E94')
    price = 118.9;
elseif strcmp(code,'E105')
    price = 128.9;
elseif strcmp(code, 'U91')
    price = 121.9;
elseif strcmp(code , 'U95')
    price = 131.9;
elseif strcmp(code,'U98')
    price = 138.9;
elseif strcmp(code,'DL')
    price = 131.9;
elseif strcmp(code,'PDL')
    price = 137.9;
else
    price = nan;
end
if ~isnan(price)
    disp(['Fuel price for ',code,' is
    ',num2str(price)]);
else
    disp(['Unknown fuel type ',code]);
end
```

switch case approach

```
code = input('Enter fuel type code :','s')
switch code
    case 'E94'
        price = 118.9;
    case 'E105'
        price = 128.9;
    case 'U91'
        price = 121.9;
    case 'U95'
        price = 131.9;
    case 'U98'
        price = 138.9;
    case 'DL'
        price = 131.9;
    case 'PDL'
        price = 137.9;
    otherwise
        price = nan;
end
if ~isnan(price)
    disp(['Fuel price for ',code,' is ',
num2str(price)]);
else
    disp(['Unknown fuel type ',code]);
end
```