if Selection

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Overview

The goal of this week's lab is to learn about the `if` control structure and use it to add error checks to some of the previously developed functions.

While loop

- The general form of the `while` loop is:

  while (condition is valid)
  ...
  end

  For example,

  ```
  >> x = 1;
  >> while x < 10
     x = x+x;
     end
  ```

  What do you expect will be the value of `x` after running the code?

IF SELECTION

- If there are only two cases to consider, then the general form of the `if` statement is:

  if (condition)
  ... MATLAB commands # 1
  else
  ... MATLAB commands # 2
  end

  If "condition" is true, "MATLAB commands # 1" will be executed; if "condition" is false, "MATLAB commands # 2" will be executed. If you want MATLAB to do nothing if "condition" is false, then you can omit the "else" portion.

- If there are three or more cases to consider, then the general form of the `if` statement is:

if (condition # 1)
...MATLAB commands # 1
elseif (condition # 2)
...MATLAB commands # 2
else (condition # 3)
...MATLAB commands # 3
end

For the case of three or more cases you often end with an "else" instead of an "elseif" statement. Examples of conditions:

```
a < b       a > b       a == b       a <= b       a >= b     a ~= b

            (a <= b && a ~= b)     (a < b || a == b)
```

Example `if` statement:

```
>> x = 2;
>> y = 3;
>> if y < x
       disp('x is greater than y.');
   else
       error('x is less than y.');
   end
```

You may need to combine relational operators. For example if you want to program the statement *if a is less than 10 or a equals to 12, then add 5 to a* you would type,

```
>> if a < 10 || a == 12
       a = a+5;
   end
```

In-Class Exercises

1. Modify `mydot.m` to check if the inputs are vectors and if their dimensions match by only using the dimensions of the inputs. Test your function with the following vector and matrix inputs.

$$u = \begin{pmatrix} 3 & 4 \end{pmatrix},\ v = \begin{pmatrix} 1 & 2 & 3 \end{pmatrix},\ w = \begin{pmatrix} 1 \\ 2 \end{pmatrix}\ x = \begin{pmatrix} 1 & 2 \end{pmatrix},\ y = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix},\ A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$$

2. By listing the first six prime numbers: 2, 3, 5, 7, 11, and 13, we can see that the 6th prime is 13. What is the 10 001st prime number? [*Source:* Project Euler]