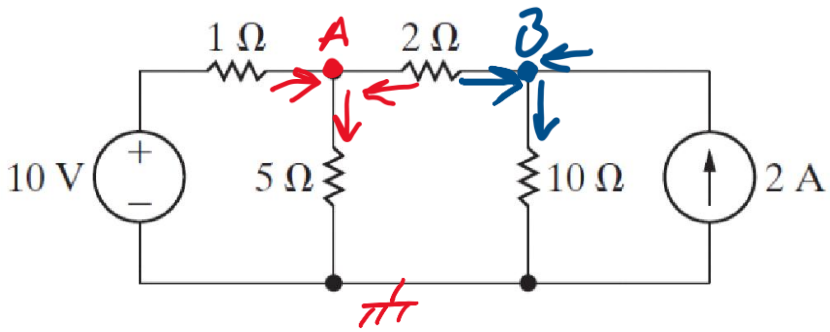
Using Matlab to solve systems of equations

Example Problem:

Example 1:



Solving for voltage at A and B

- **We'll be using the nodal method to solve this circuit. For now, don't worry about what I'm doing just look at the equations I define and what I do in Matlab**

Defining your equations

- Equations at Node A
  - $\frac{A-0}{5} - \frac{10-A}{1} - \frac{B-A}{2} = 0$
- Equations at Node B
  - $\frac{B-0}{10} - 2 - \frac{A-B}{2} = 0$

Simplifying and rearranging nodes A and B

- A: $0 = 17A - 5B - 100$
- B: $0 = 6B - 5A - 20$

Moving to Matlab

1. First set all variables up in Matlab that you will be using the syms command

```
%   Defining your Variables %
syms Va Vb
```

2. Next define your equations in Matlab

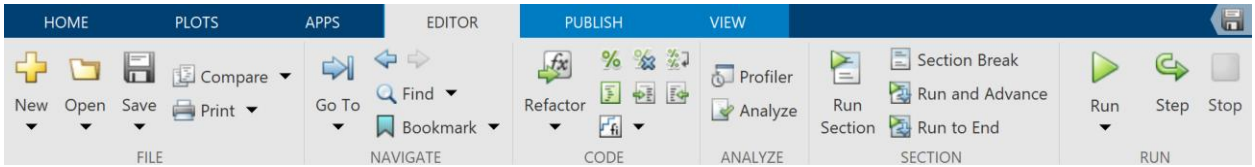
a. Note: we can either use the original or simplified equations I choose to use the simplified version for the sake of this example because its clearer but if you're in a time crunch, I would go with your original form.

```
%   Defining your equations %
eqn1 = 17*Va - 5*Vb - 100 == 0;
eqn2 = 6*Vb - 5*Va -20 == 0;
```

3. Set up the solve command in matlab
   a. Note: if you skip a semicolon Matlab will print in the command window your equations or values depending on the context

```
%   solving your system of equations    %
solution = solve([eqn1,eqn2],[Va,Vb])
```

4. Getting our solutions
   a. Hit the run button and the answers will be spit out in the command window




```
solution =

  struct with fields:

    Va: 100/11
    Vb: 120/11
```

Additional Resources:

https://www.mathworks.com/help/symbolic/solve-a-system-of-linear-equations.html

https://www.mathworks.com/help/

highlighting a command and pressing F1 will also open a help window