

Explain the purpose of memory and CPU in a computing device. Indicate also the two major sub-components of the CPU and their respective jobs. Finally, describe in general terms the Fetch/Execute cycle.

- Memory: holds instructions (applications, programs) and data (yet to be processed information) while the machine is running.
- CPU. processes the data alluded to above using the instructions mentioned.
- CPU sub-components: Control Unit and ALU (Arithmetic Logic Unit). Control Unit's job: decoding instructions. ALU's job: performing arithmetic and logic operations.
- Fetch/ Execute cycle: continuous interaction between Memory and CPU in order to process data. On the Fetch side, transfer of instructions and data from memory to CPU; on the Execution side: processing data and storing the result in memory.

Describe a technique to change the brightness of a Black & White (B&W) picture. Describe also an approach to colorize a B&W picture.

- Changing brightness of B&W picture: adding - or subtracting - the same value to every sub-pixel of all pixels in the picture. This will increase or decrease the brightness of the entire picture.
- Colorizing a B&W picture: divide the pixels into three groups: Highlights (brighter pixels), Shadows (darker pixels) and Midrange pixels (pixels with mid-values). Then, break the equilibrium among the subpixels - in B&W pictures subpixels have the same value inside each pixel - by adding values to certain subpixels while decreasing the value of other subpixels based on the group to which they belong.

Write an HTML program to produce the following list. Use the most appropriate tags for the code. The <head> section of the HTML program may be omitted.

- New York
- New Jersey
 - Newark
 - *New Brunswick*
- Connecticut

```
<!DOCTYPE html>
<html>
  <body>
    <ul>
      <li>New York</li>
      <li>New Jersey</li>
    </ul>
    <li>Newark</li>
    <li><i>New Brunswick</i></li>
  </ul>
  <li>Connecticut</li>
</body>
</html>
```

Write an HTML program to produce the following table. Use the most appropriate tags for the code. The <head> section of the HTML program may be omitted.

Name	Country	City	Industry
Ford	USA	Dearborn	Automotive
Sony	Japan	Minato	Conglomerate

```
<!DOCTYPE html>
<html>
  <body>
    <table border="1">
      <caption>International Corporations</caption>
      <tr>
        <th>Name</th>
        <th>Country</th>
        <th>City</th>
        <th>Industry</th>
      </tr>
      <tr>
        <td>Ford</td>
        <td>USA</td>
        <td>Dearborn</td>
        <td>Automotive</td>
      </tr>
      <tr>
        <td>Sony</td>
        <td>Japan</td>
        <td>Minato</td>
        <td>Conglomerate</td>
      </tr>
    </table>
  </body>
</html>
```

Write the <body> section of the HTML code required to produce the webpage displayed below. Use the most appropriate tags for the code.

Notes:

- 1) The hyperlink shown is a link to: https://en.wikipedia.org/wiki/The_Laws_of_Thought
- 2) The image source name is: George_Boole_color.jpg. The alternative text for the image tag is: Boole. (Tip: consider also the use of a style "float:left" in the image tag).

George Boole

George Boole was an English mathematician, educator, philosopher and logician. Boole was born in Lincoln, Lincolnshire, England, the son of John Boole, a shoemaker and Mary Ann Joyce. He is best known as the author of [The Laws of Thought](https://en.wikipedia.org/wiki/The_Laws_of_Thought) (1854) which contains **Boolean algebra**.



Boolean logic is credited with laying the foundations for the information age.

```
<!DOCTYPE html>
<html>
  <head>
    <title>George Boole</title>
  </head>
  <body>
    <h2>George Boole</h2>
    <p><b>George Boole</b> was an English mathematician, educator, philosopher
      and logician. Boole was born in Lincoln, Lincolnshire, England,
      the son of John Boole, a shoemaker and Mary Ann Joyce. He is best known as
      the author of <a href="https://en.wikipedia.org/wiki/The_Laws_of_Thought">
      The Laws of Thought</a> (1854) which contains <b>Boolean algebra</b>.</p>

    <p><i>Boolean logic</i> is credited with laying
      the foundations for the information age. </p>

  </body>
</html>
```

Write a function to calculate the energy of a mass. The function should use two parameters: mass and speed of light. The mathematical formula is:

$$E = m \times c^2$$

where E: energy, m: mass and c: speed of light.

```
function energyOfMass(m,c) {
  var energy;
  energy = m*c*c;
  return energy;
}
```

Also:

```
function energyOfMass(m,c) {
  return m*c*c;
}
```

}

Math.pow(c, 2) or c**2

Return

Show your work or reasoning for this question. Given the following code:

```
var tolls, oil, state, total_expense;
tolls=1;
oil=2;
state="NJ";
if (state=="NY" && tolls ==1) {
    tolls=8;
    oil=10;
}
else {
    if (state=="NJ" && tolls <2) {
        tolls=5;
        oil=3;
    }
    else {
        tolls=9;
        oil=7;
    }
}
total_expense = 5*oil + 3*tolls;
```

tolls: 5

total_expense:

30

Show your work or reasoning for this question. Given the following code:

```
var x=1, y=3, z=6;
var ans;

function calcSuper(m, n, p) {
    var x, y;
    x = m*3;
    y = n + 2;
    z = y + 1;
    return x+y;
}

ans=calcSuper(x, y, z);
```

ans:

8

Show your work or reasoning for this question. Given the following code:

```
var a = 5, b = 3, c = 3;
var i;

for(i=0; i<b; i=i+1) {
    c = c +2;
    a = a - 1;
}

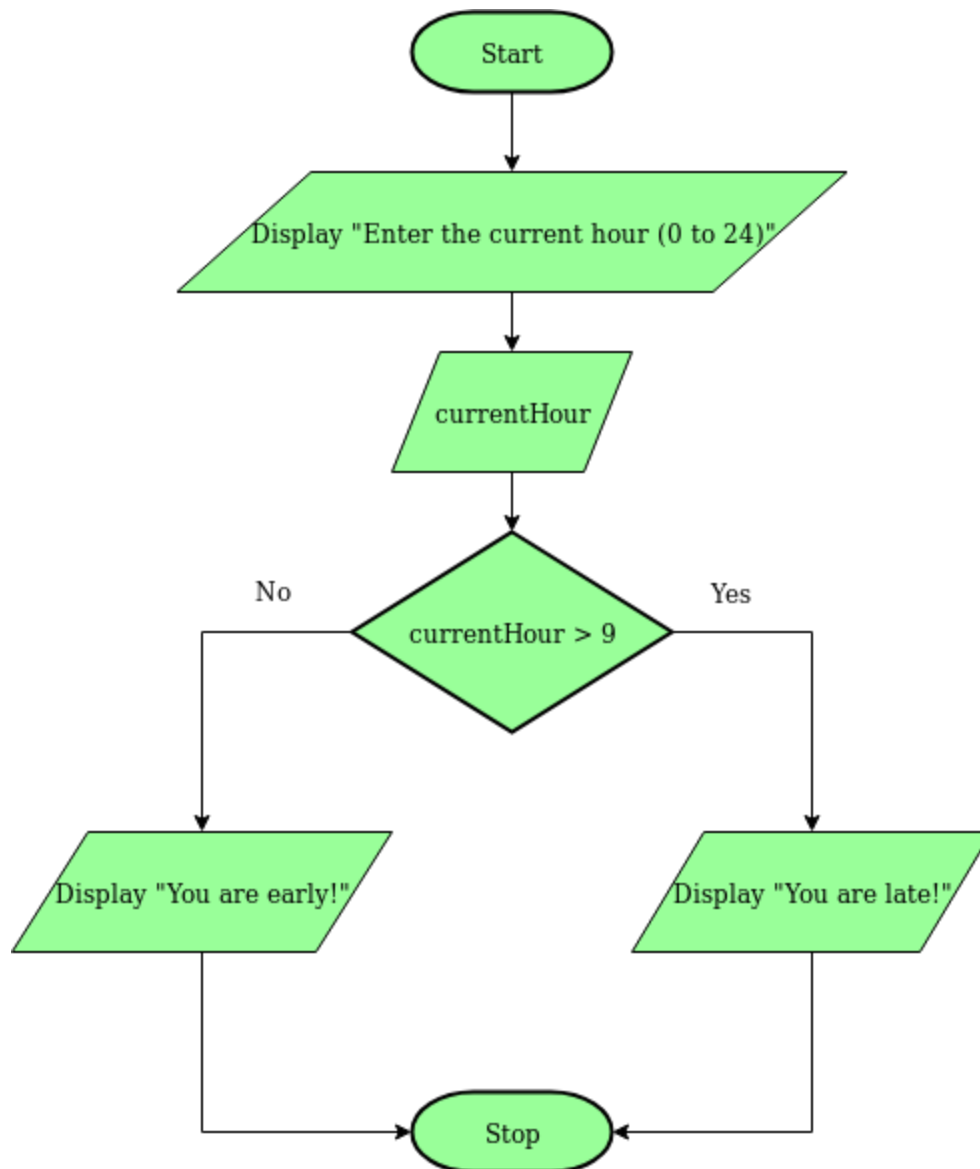
if (b >=c)
    b = b - 1;
else
    b = b +2;
```

a: 2

b: 5

c: 9

Write pseudocode or JavaScript code to implement the flowchart displayed below.



Pseudocode:

```
Start
Display "Enter the current hour (0 to 24)"
Input currentHour
If currentHour > 9 Then
    Display "You are late!"
Else
    Display "You are early!"
End If
Stop
```

JavaScript:

```
var currentHour = prompt("Enter the current hour (0 to 24)");
if (currentHour > 9)
    alert("You are late!");
else
    alert("You are early!");
```