

HW2

Question 1:

To keep the per-unit cost below \$50, we need to calculate the total cost of production and divide it by the number of units produced. The total cost of production is the sum of the product unit cost and the (NRE) cost.

Let's assume the number of units produced is x . Then, the total cost of production is: $40 * x + 10,000$.

And the per-unit cost is: $(40 * x + 10,000) / x$.

We want to find the value of x such that the per-unit cost is below \$50. So, we need to solve the following inequality:

$$\Rightarrow (40 * x + 10,000) / x < 50$$

$$\Rightarrow 40 + (10,000 / x) < 50$$

$$\Rightarrow 10,000 / x < 10$$

$$\Rightarrow 1,000 / x < 1$$

$$\Rightarrow 1000 < x$$

So, the minimum number of units x that must be produced to keep the per-unit cost below \$50 is 1000 units.

Question 2:

a) Write 4 differences between microprocessor and microcontroller.

Purpose:

Microprocessors are general-purpose devices that can be programmed to perform a wide range of tasks, whereas microcontrollers are designed for specific applications, such as controlling appliances, monitoring sensors, and managing data.

Architecture:

Microprocessors have a more complex architecture, with separate components for the central processing unit (CPU), memory, and input/output (I/O) functions. Microcontrollers, on the other hand, integrate these components into a single integrated circuit (IC).

Processing:

Microprocessors have high processing power while microcontrollers have high processing power.

Input/Output (I/O) capabilities:

Microprocessors often have limited I/O capabilities, requiring the use of external devices to control input and output operations. Contrarily, microcontrollers are highly suited for embedded systems because they contain a broad range of integrated I/O capabilities, such as timers, analog-to-digital converters, and communication interfaces.

b) The microcontroller in the Arduino Uno board is the ATmega328P.

For the following pins of the Arduino Uno board:

Pin 4 > port No 4 and Port name D.

Pin 10 > port No 2 and Port name B.

Pin 15 > port No 1 and Port name C.

c) Write a C code for Arduino Uno to set the Pin 7 to Output mode and then turn ON an LED connected to that pin.

```
Void setup() {  
  pinMode(7,OUTPUT);  
}  
Void loop() {  
  digitalWrite(7,HIGH);  
}
```