Name_Mahir Rahman_____

**EE/CE1100**   **Arduino Lab Homework**   **Fall 2020**

Work all the problems in this assignment, save as a pdf file and submit that pdf file to eLearning.

<u>Problem 1:</u> Using TinkerCad setup an Arduino and a breadboard. Add two LEDs (one red and one green) each connected to a separate OUTPUT pins (your choice on which pins to use) and two push buttons connected to separate INPUT pins (again, your choice on which pins to use). Add the appropriate protective and pull-up resistors to operate the LEDs and the push buttons as we have demonstrated in the Lab sessions this week. Beginning with the Button example program for the Arduino, modify the code so that when you start the simulation you can turn on the red LED by pushing one of the buttons and you can turn on the green LED by pushing the other button.

a) (10 points) Capture a screen shot of your setup in TinkerCad and paste that screen shot here:
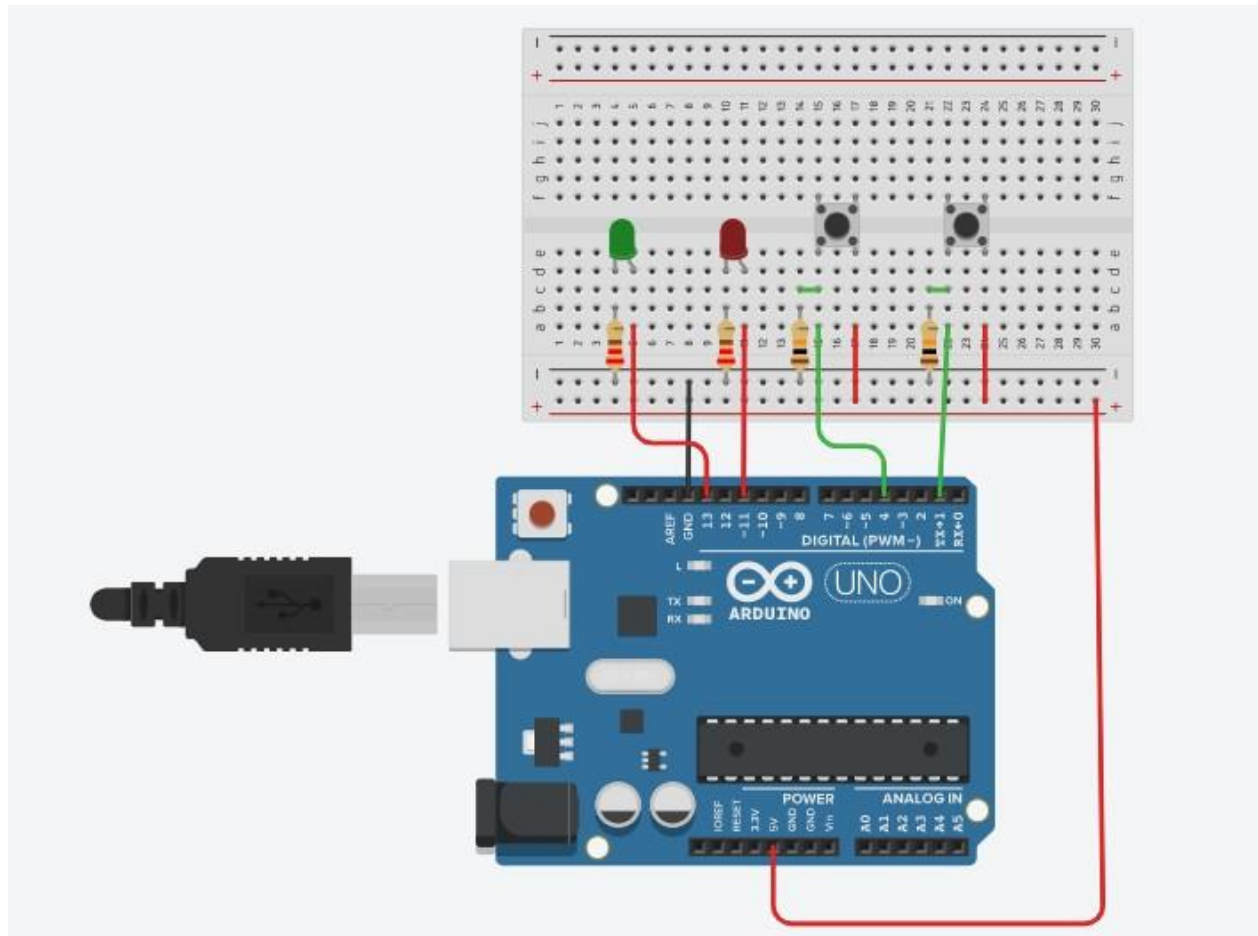
b) (10 points) Copy your Arduino code and paste a complete copy of that code here:

// constants won't change. They're used here to set pin numbers:

```arduino
const int buttonPin = 1;  // the number of the pushbutton pin

const int ledPin =  11;  // the number of the LED pin

const int buttonPin2 = 4; // the number of the second pushbutton pin

const int ledPin2 = 13;  // the number of the second LED pin


// variables will change:

int buttonState = 0;    // variable for reading the pushbutton status

int buttonState2 = 0;      // variable for reading the second pushbutton status

void setup() {

  // initialize the LED pins as output:

  pinMode(ledPin, OUTPUT);

  pinMode(ledPin2, OUTPUT);

  // initialize the pushbutton pins as input:

  pinMode(buttonPin, INPUT);

  pinMode(buttonPin2, INPUT);

}


void loop() {

  // read the states of the pushbutton values:

  buttonState = digitalRead(buttonPin);

  buttonState2 = digitalRead(buttonPin2);

  // check if the pushbutton is pressed. If it is, the buttonState is HIGH:

  if (buttonState == HIGH) {

    // turn LED on:

    digitalWrite(ledPin, HIGH);

  } else {

    // turn LED off:

    digitalWrite(ledPin, LOW);

  }
```

```
// check if the second pushbutton is pressed.

if (buttonState2 == HIGH) {

digitalWrite(ledPin2, HIGH);

} else {

  digitalWrite(ledPin2, LOW);

}


} // end void loop()
```

c) (10 points) Go to the Share button in TinkerCad, Invite People and copy the hyperlink to your TinkerCad design. Paste that hyperlink here so I can run the simulation:

https://www.tinkercad.com/things/166nQzBJpGq-epic-wolt-fulffy/editel?sharecode=0JZ3K-nJsQs-auwW5RnOgWaKRIxc_mtbTE9slIstjC8

Problem 2: Make a duplicate of your setup for Problem 1 – to do this, go the theTinkerCad dashboard where you start new circuits; you should have a display of your circuits – place your mouse curser over the Problem 1 circuit and click on the grey gear symbol for the options; then click on Duplicate and it will make a copy of your setup. Now, modify your code for this setup to do the following:

When you press one button (your choice which one), both LEDs will blink ON for half a second and then OFF for half a second and will continue doing that for as long as you hold that button down.

When you press the other button, the blinking of the LEDs will alternate – red ON green OFF for half a second then red OFF green ON for half a second and will continue doing that for as long as you hold that other button down. LEDs will be OFF when neither button is pressed.

a) (10 points) Capture a screen shot of your setup in TinkerCad and paste that screen shot here:
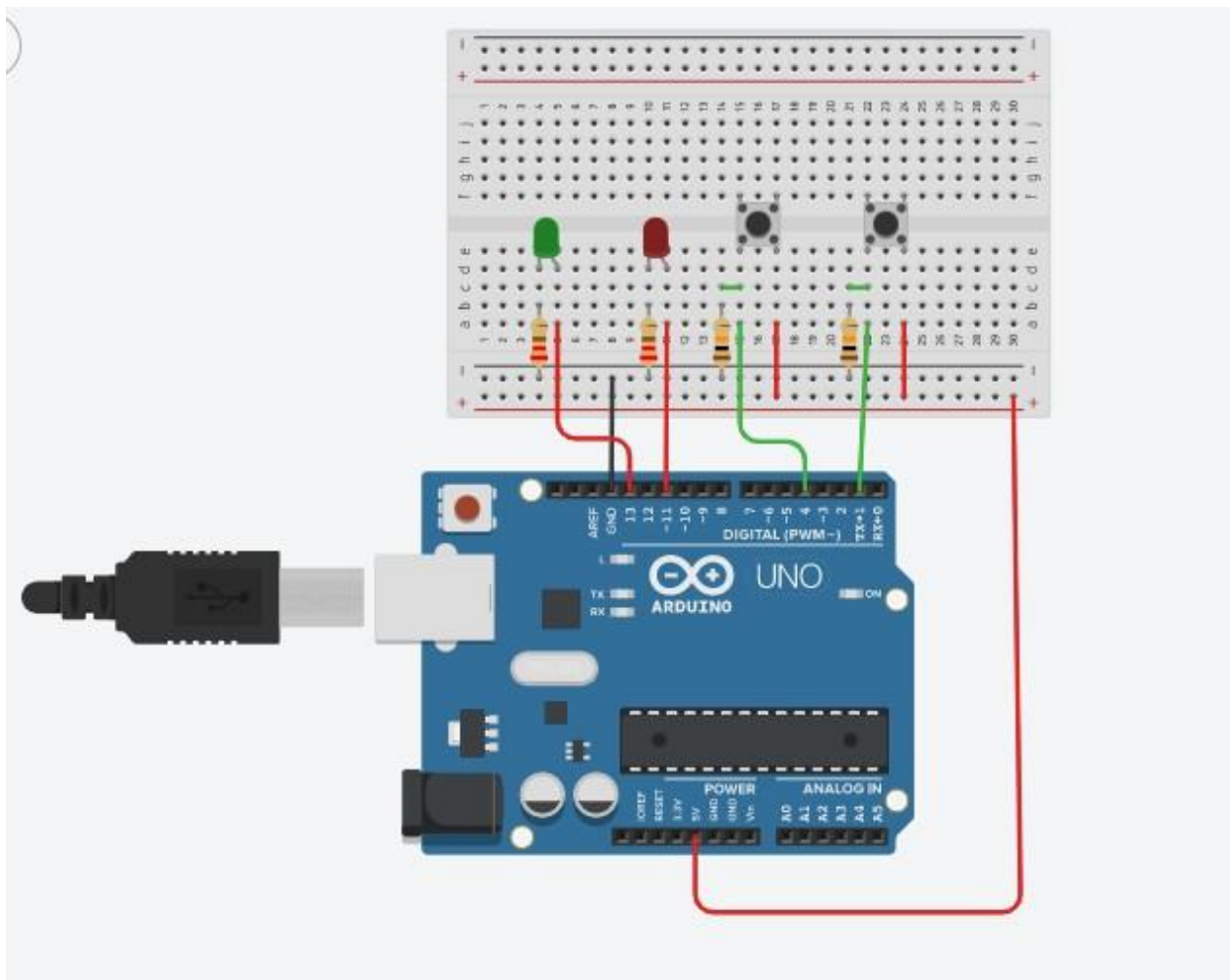
b) (10 points) Copy your Arduino code and paste a complete copy of that code here:

```
const int buttonPin = 1;     // the number of the pushbutton pin
const int ledPin =  11;      // the number of the LED pin
const int ledPin2 = 13;               // the number of the second lED pin
const int buttonPin2 = 4;  // the number of the second pushbutton pin
// variables will change:
int buttonState = 0;  // variable for reading the pushbutton status
int buttonState2 = 0; // variable for reading the second pushbutton status

void setup() {
 // initialize the LED pins as output:
 pinMode(ledPin, OUTPUT);
 pinMode(ledPin2, OUTPUT);
 // initialize the pushbutton pins as input:
 pinMode(buttonPin, INPUT);
 pinMode(buttonPin2, INPUT);
}

void loop() {
 // read the state of the pushbutton values:
 buttonState = digitalRead(buttonPin); buttonState2 = digitalRead(buttonPin2);

 // check if the pushbutton is pressed. If it is, the buttonState is HIGH:
 if (buttonState == HIGH) {

   digitalWrite(ledPin, HIGH);
   digitalWrite(ledPin2, HIGH);
   delay(500);
   digitalWrite(ledPin, LOW);
   digitalWrite(ledPin2, LOW);
   delay(500);

 } else {
   // turn LED off:
   digitalWrite(ledPin, LOW);
   digitalWrite(ledPin2, LOW);
 }
   // check if the pushbutton is pressed. If it is, the buttonState2 is HIGH:
 if (buttonState2 == HIGH) {


   digitalWrite(ledPin, HIGH);
   digitalWrite(ledPin2, LOW);
   delay(500);
   digitalWrite(ledPin, LOW);
```

```
      digitalWrite(ledPin2, HIGH);
      delay(500);

    } else {
      // turn LED off:
      digitalWrite(ledPin, LOW);
      digitalWrite(ledPin2, LOW);
    }
   }
```

c) (10 points) Go to the Share button in TinkerCad, Invite People and copy the hyperlink to your TinkerCad design. Paste that hyperlink here so I can run the simulation:

https://www.tinkercad.com/things/259oC6MHZux-problem-2/editel?sharecode=0jwjMOleouw0uOgkwAEHf1K1Z4WXuRWGQWBvxlglTt0

Problem 3:Again, make a duplicate of your setup from Problem 1. In this setup, eliminate the red LED and the button that controls it. Modify the code in your setup so that when you push the remaining button for the green LED, the green LED turns ON and then stays on when you release the button. Then when you press the button again, the green LED turns OFF. So the operation is: press the button to turn ON the green LED; its stays on until you press the button again and then it turns OFF. (Comment – this will be a bit more difficult to setup than the first two problems, so you will have to give this some thought as to how to control the operation in the program).

  a) (10 points) Capture a screen shot of your setup in TinkerCad and paste that screen shot here:
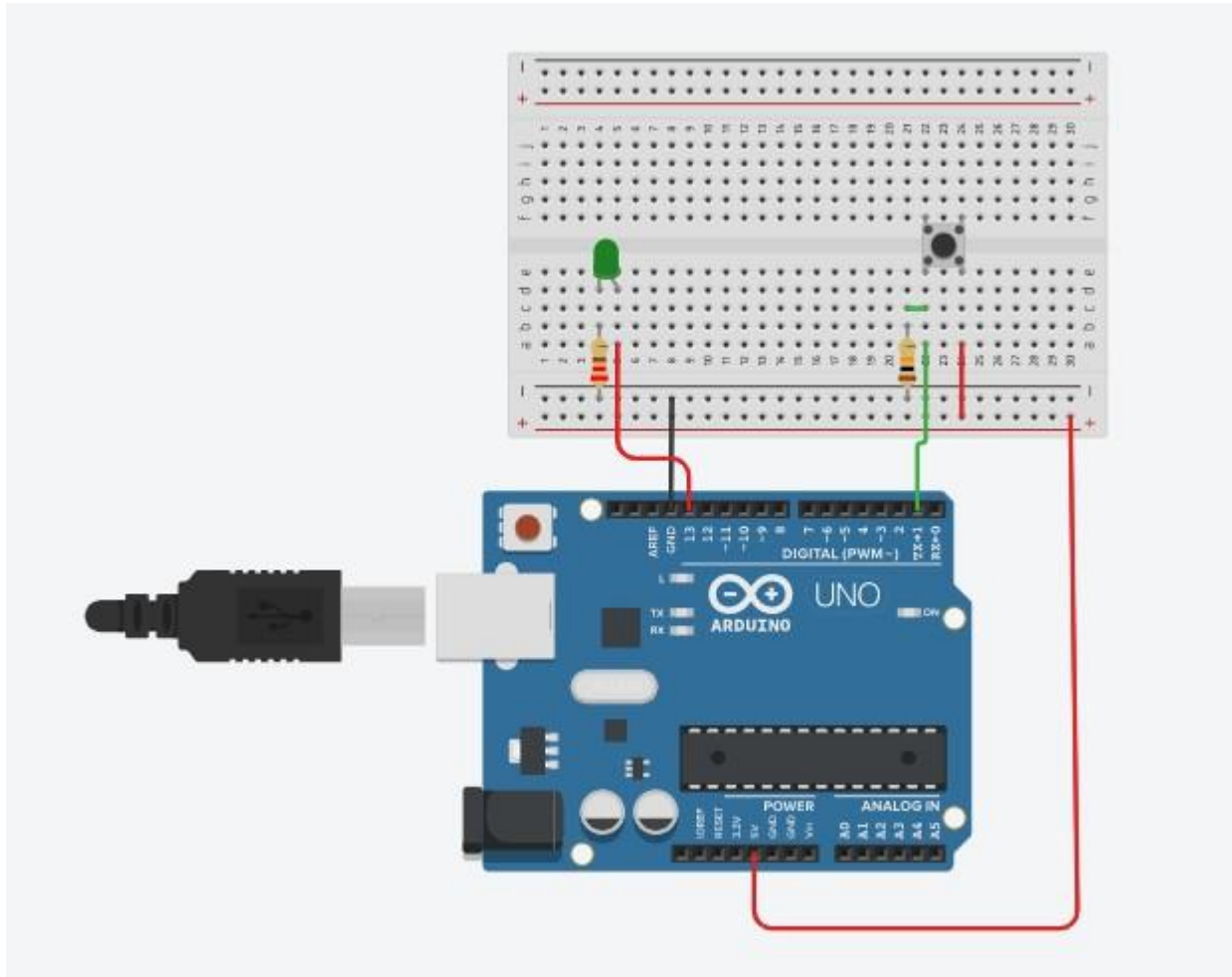
  b) (10 points) Copy your Arduino code and paste a complete copy of that code here:

const int buttonPin = 1; // holds the number of the pushbutton pin

const int ledPin = 13;   //holds the number of the led pin

int buttonStateOld = 0; //holds the number of the old button state

```
int buttonStateNew;  //holds the number of the new button state

int ledState = 0;        //holds the number of the led state

void setup() {

 // put your setup code here, to run once:

  pinMode(ledPin, OUTPUT);

  pinMode(buttonPin, INPUT);

}


void loop() {

 // put your main code here, to run repeatedly:

  buttonStateNew = digitalRead(buttonPin);

//This function checks the state of the previous and new button states

  if (buttonStateNew == HIGH && buttonStateOld == LOW) {

//this checks if led state is HIGH or LOW

   if (ledState == 0) {

   digitalWrite(ledPin, HIGH);

    ledState = 1;

   }

   else {

    digitalWrite(ledPin, LOW);

    ledState = 0;

   }

 } // end void loop()

   buttonStateOld = buttonStateNew; //new button value becomes old button value

   delay(100);

}
```

    c)   (10 points) Go to the Share button in TinkerCad, Invite People and copy the hyperlink to your TinkerCad design. Paste that hyperlink here so I can run the simulation:

https://www.tinkercad.com/things/55ekJa3aQER-copy-of-problem-1/editel?sharecode=K64WI0-hhnqttkkmSSMndvjJwHEDYLwJQL9Rr7RLkgQ