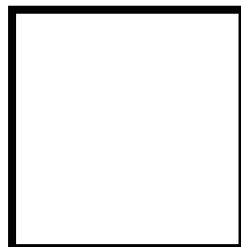**PAMANTASAN NG LUNGSOD NG MAYNILA**

(University of the City of Manila)

Intramuros, Manila

Microprocessor Lab

Laboratory Activity No. 3

**Binary Representation of 8 LEDs in Tinkercad and
Arduino Programming**

Score

Submitted by:
Lamagna, Aaron A.
Saturday 10:00 AM to 1:00 PM / CPE 0412.1-1

Date Submitted
13-10-2023

Submitted to:

Engr. Maria Rizette H. Sayo

I.   Objectives

This laboratory activity aims to implement the principles and techniques of hardware programming using Arduino through:

-       To create Arduino circuit of Binary Representation (decimal 0-256 using 8 LEDs)

II.   Method/s
-       Perform a task problem given in the presentation.
-       Write a code and perform an Arduino circuit diagram of Binary Representation (decimal 0-256 using 8 LEDs)

III.   Results

TinkerCad

Exercise 1: Write a code that does a Binary Representation (decimal 0 -256 using 8 LEDs)
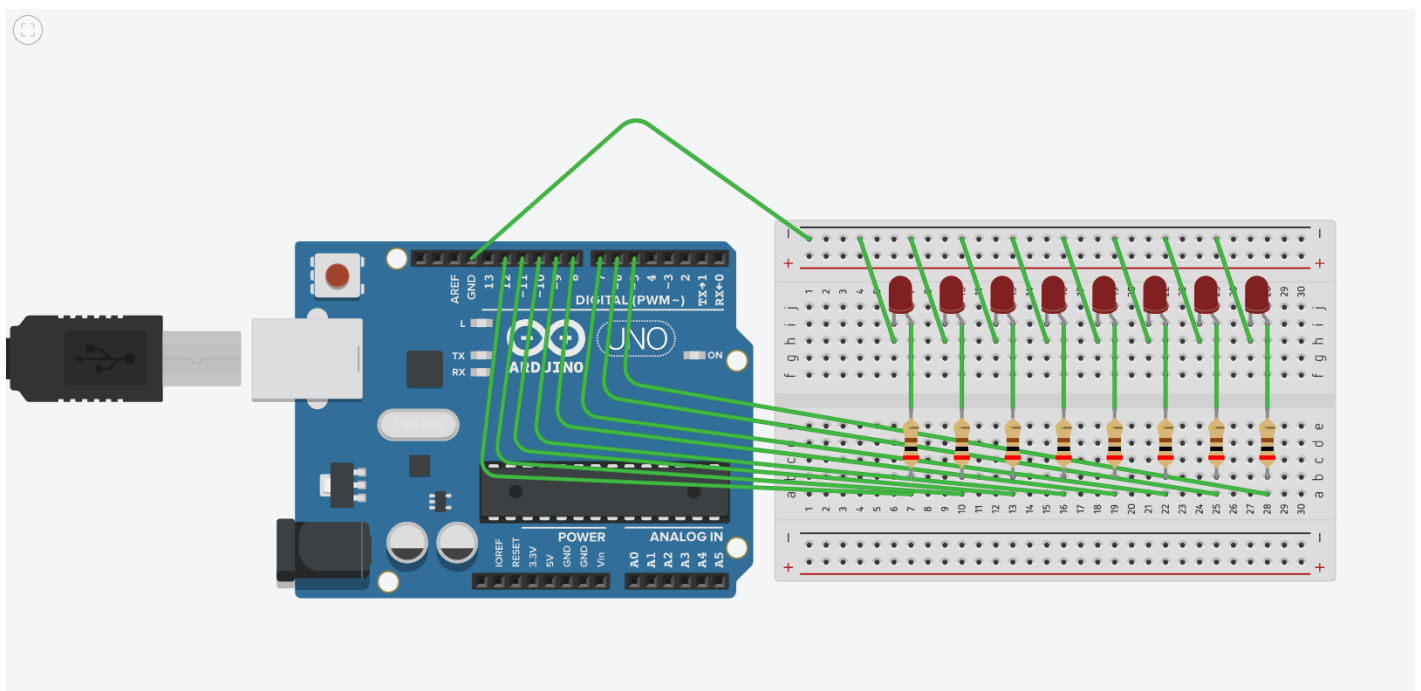

Figure No.2 Binary Representation (decimal 0 -256 using 8 LEDs)

Components Used

1. 8 LEDs
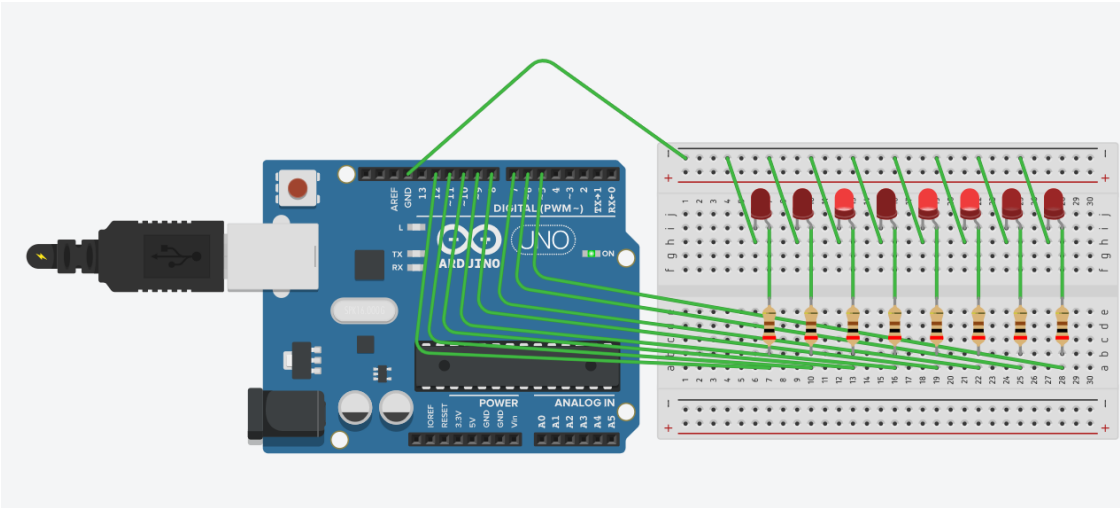
2. Resistor

3. Breadboard

4. Arduino UNO

5. Jump Wires

CODE:

```cpp
// C++ code
//
/*
    Aaron A. Lamagna
    2020-11775
    Activity No. 3
*/

// Define the pins for the LEDs
int ledPins[] = {5, 6, 7, 8, 9, 10, 11, 12};
int numLEDs = sizeof(ledPins) / sizeof(ledPins[0]); // Calculate the number of LEDs

void setup() {
  // Set LED pins as outputs
  for (int i = 0; i < numLEDs; i++) {
    pinMode(ledPins[i], OUTPUT);
  }

  Serial.begin(9600);
}

void loop() {
  // Loop through decimal numbers from 0 to 255
  for (int decimalValue = 0; decimalValue < 256; decimalValue++) {
    // Display the binary representation using LEDs
    for (int bit = 0; bit < numLEDs; bit++) {
      int state = (decimalValue >> bit) & 1;
      digitalWrite(ledPins[bit], state);
    }

    // Send the Decimal Valuies to the Serial Monitor
    Serial.print("Decimal: ");
    Serial.print(decimalValue);
    Serial.print("\n");
    // Delay to observe the binary representation
    delay(1000);
  }

}
```
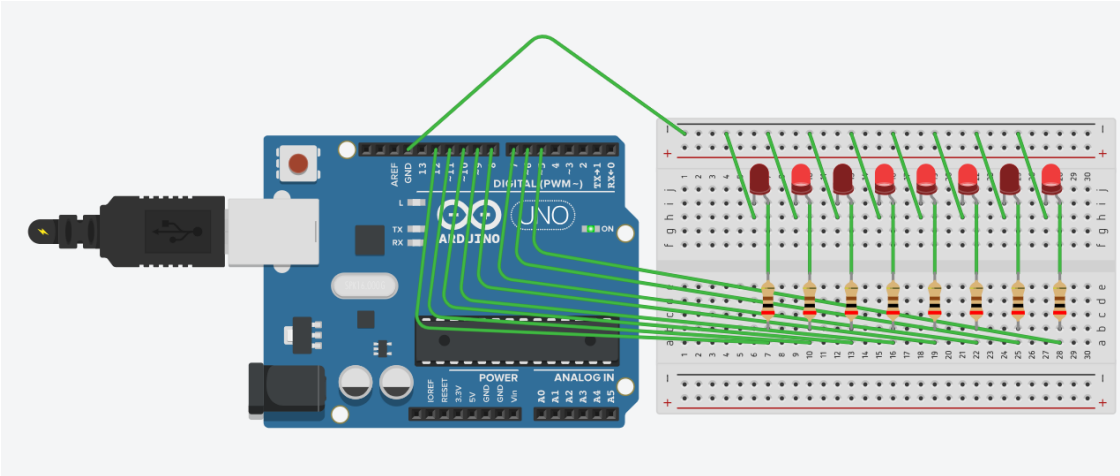
RESULT:

0 to 49	49 to 97	97 to 146	146 to 195	195 to 244	244 to Reset

Serial Monitor columns:

```
Serial Monitor     Serial Monitor     Serial Monitor     Serial Monitor     Serial Monitor
Decimal: 0         Decimal: 48        Decimal: 97        Decimal: 146       Decimal: 195       Decimal: 244
Decimal: 1         Decimal: 49        Decimal: 98        Decimal: 147       Decimal: 196       Decimal: 245
Decimal: 2         Decimal: 50        Decimal: 99        Decimal: 148       Decimal: 197       Decimal: 246
Decimal: 3         Decimal: 51        Decimal: 100       Decimal: 149       Decimal: 198       Decimal: 247
Decimal: 4         Decimal: 52        Decimal: 101       Decimal: 150       Decimal: 199       Decimal: 248
Decimal: 5         Decimal: 53        Decimal: 102       Decimal: 151       Decimal: 200       Decimal: 249
Decimal: 6         Decimal: 54        Decimal: 103       Decimal: 152       Decimal: 201       Decimal: 250
Decimal: 7         Decimal: 55        Decimal: 104       Decimal: 153       Decimal: 202       Decimal: 251
Decimal: 8         Decimal: 56        Decimal: 105       Decimal: 154       Decimal: 203       Decimal: 252
Decimal: 9         Decimal: 57        Decimal: 106       Decimal: 155       Decimal: 204       Decimal: 253
Decimal: 10        Decimal: 58        Decimal: 107       Decimal: 156       Decimal: 205       Decimal: 254
Decimal: 11        Decimal: 59        Decimal: 108       Decimal: 157       Decimal: 206       Decimal: 255
Decimal: 12        Decimal: 60        Decimal: 109       Decimal: 158       Decimal: 207       Decimal: 0
Decimal: 13        Decimal: 61        Decimal: 110       Decimal: 159       Decimal: 208       Decimal: 1
Decimal: 14        Decimal: 62        Decimal: 111       Decimal: 160       Decimal: 209       Decimal: 2
Decimal: 15        Decimal: 63        Decimal: 112       Decimal: 161       Decimal: 210       Decimal: 3
Decimal: 16        Decimal: 64        Decimal: 113       Decimal: 162       Decimal: 211       Decimal: 4
Decimal: 17        Decimal: 65        Decimal: 114       Decimal: 163       Decimal: 212       Decimal: 5
Decimal: 18        Decimal: 66        Decimal: 115       Decimal: 164       Decimal: 213       Decimal: 6
Decimal: 19        Decimal: 67        Decimal: 116       Decimal: 165       Decimal: 214
Decimal: 20        Decimal: 68        Decimal: 117       Decimal: 166       Decimal: 215
Decimal: 21        Decimal: 69        Decimal: 118       Decimal: 167       Decimal: 216
Decimal: 22        Decimal: 70        Decimal: 119       Decimal: 168       Decimal: 217
Decimal: 23        Decimal: 71        Decimal: 120       Decimal: 169       Decimal: 218
Decimal: 24        Decimal: 72        Decimal: 121       Decimal: 170       Decimal: 219
Decimal: 25        Decimal: 73        Decimal: 122       Decimal: 171       Decimal: 220
Decimal: 26        Decimal: 74        Decimal: 123       Decimal: 172       Decimal: 221
Decimal: 27        Decimal: 75        Decimal: 124       Decimal: 173       Decimal: 222
Decimal: 28        Decimal: 76        Decimal: 125       Decimal: 174       Decimal: 223
Decimal: 29        Decimal: 77        Decimal: 126       Decimal: 175       Decimal: 224
Decimal: 30        Decimal: 78        Decimal: 127       Decimal: 176       Decimal: 225
Decimal: 31        Decimal: 79        Decimal: 128       Decimal: 177       Decimal: 226
Decimal: 32        Decimal: 80        Decimal: 129       Decimal: 178       Decimal: 227
Decimal: 33        Decimal: 81        Decimal: 130       Decimal: 179       Decimal: 228
Decimal: 34        Decimal: 82        Decimal: 131       Decimal: 180       Decimal: 229
Decimal: 35        Decimal: 83        Decimal: 132       Decimal: 181       Decimal: 230
Decimal: 36        Decimal: 84        Decimal: 133       Decimal: 182       Decimal: 231
Decimal: 37        Decimal: 85        Decimal: 134       Decimal: 183       Decimal: 232
Decimal: 38        Decimal: 86        Decimal: 135       Decimal: 184       Decimal: 233
Decimal: 39        Decimal: 87        Decimal: 136       Decimal: 185       Decimal: 234
Decimal: 40        Decimal: 88        Decimal: 137       Decimal: 186       Decimal: 235
Decimal: 41        Decimal: 89        Decimal: 138       Decimal: 187       Decimal: 236
Decimal: 42        Decimal: 90        Decimal: 139       Decimal: 188       Decimal: 237
Decimal: 43        Decimal: 91        Decimal: 140       Decimal: 189       Decimal: 238
Decimal: 44        Decimal: 92        Decimal: 141       Decimal: 190       Decimal: 239
Decimal: 45        Decimal: 93        Decimal: 142       Decimal: 191       Decimal: 240
Decimal: 46        Decimal: 94        Decimal: 143       Decimal: 192       Decimal: 241
Decimal: 47        Decimal: 95        Decimal: 144       Decimal: 193       Decimal: 242
Decimal: 48        Decimal: 96        Decimal: 145       Decimal: 194       Decimal: 243
Decimal: 49        Decimal: 97        Decimal: 146       Decimal: 195       Decimal: 244
```
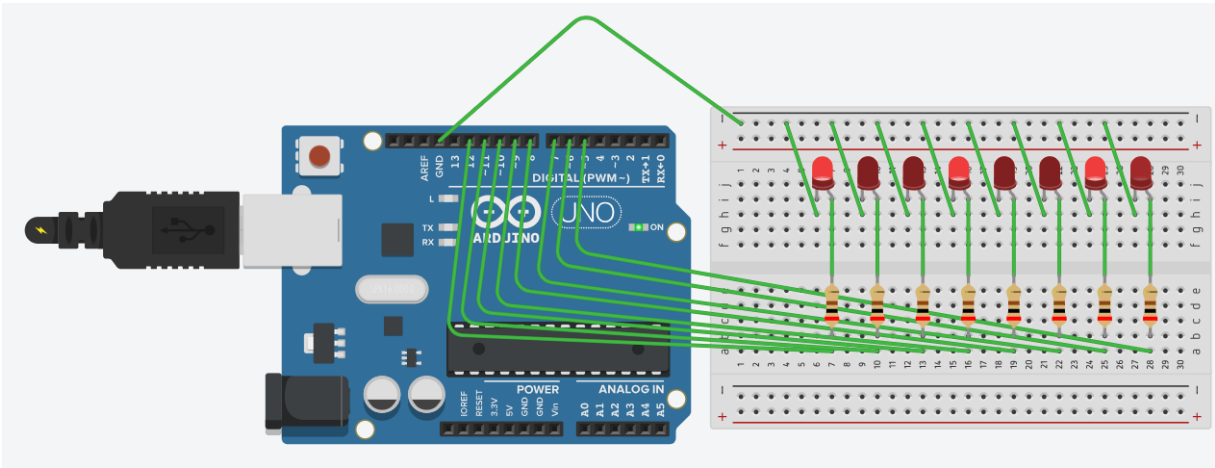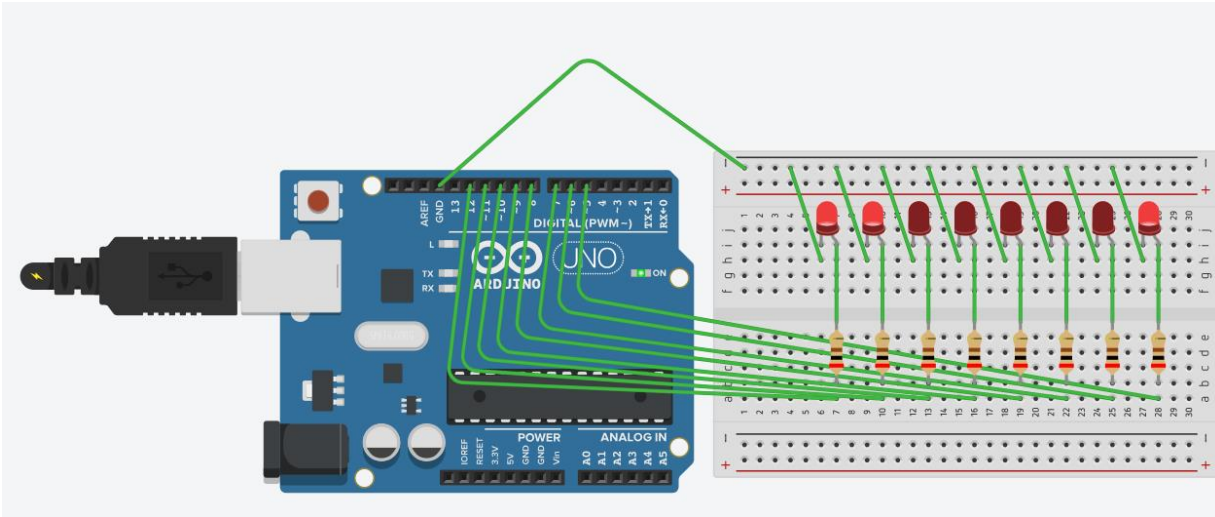
0 to 44

44 to 97
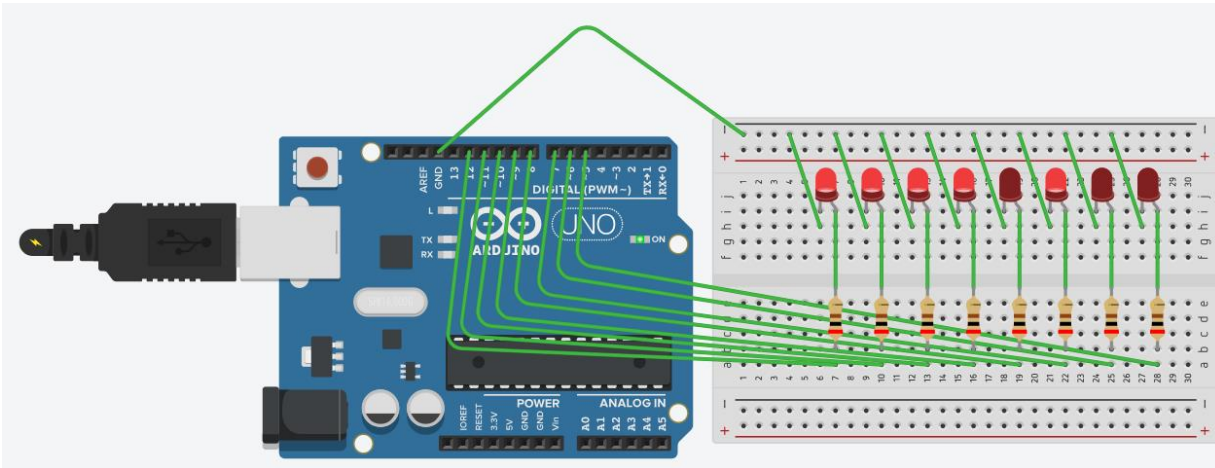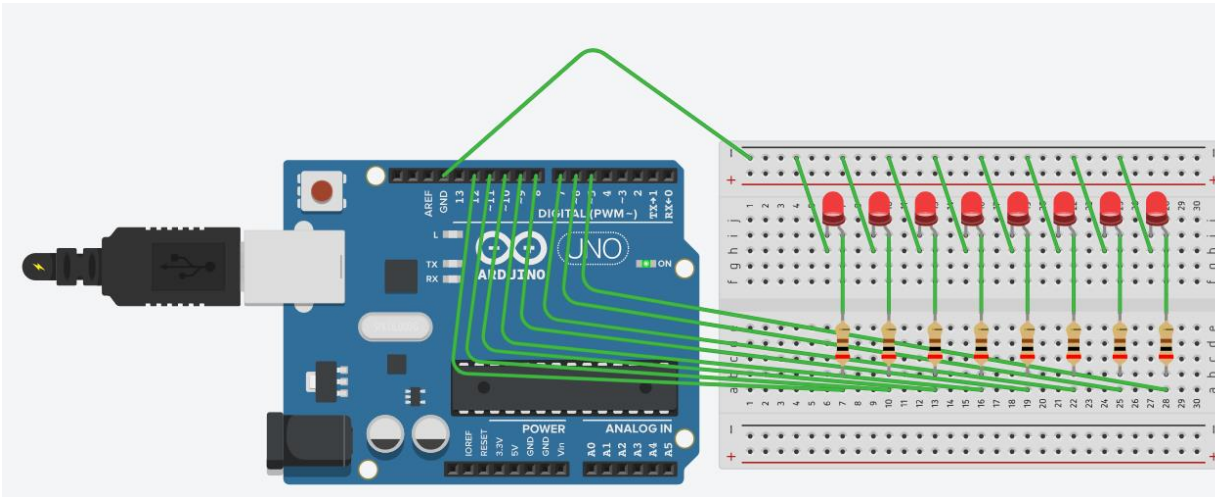
97 to 146

146 to 195

195 to 244

244 to 256

IV. Conclusion

For the Lab Activity No. 3 of the Microprocessors Lab, I write a code that does a Binary Representation of a decimal 0 to 256 using 8 LEDs using tinkercad. The binary representation of decimal values ranging from 0 to 255 is represented by the code by initializing an array of LED pins. It accomplishes this by iterating through the decimal numbers and showing on the LEDs their binary form. You can view the decimal representations since it also prints the decimal value to the Serial Monitor.

Overall, this code provides a useful illustration of how to translate decimal values into binary, show them using LEDs, and provide a visual output in the Serial Monitor to view the decimal values. In the context of an Arduino project, it's a helpful educational tool for studying binary representation and its relationship to decimal values.