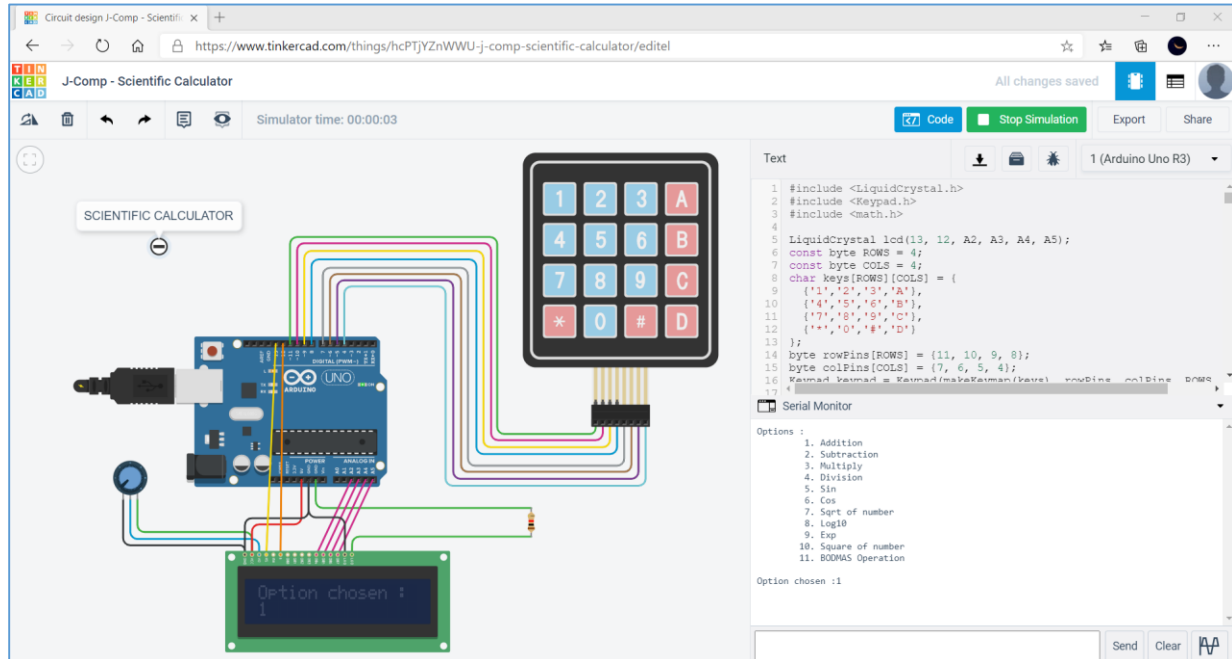
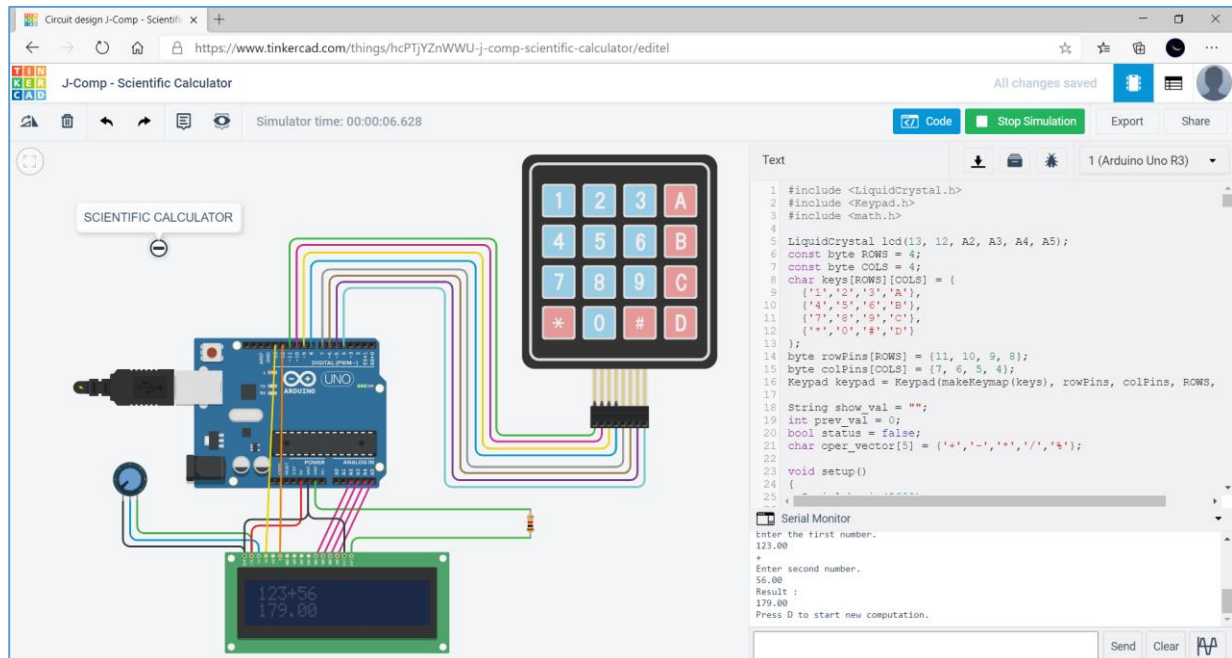


OUTPUT:

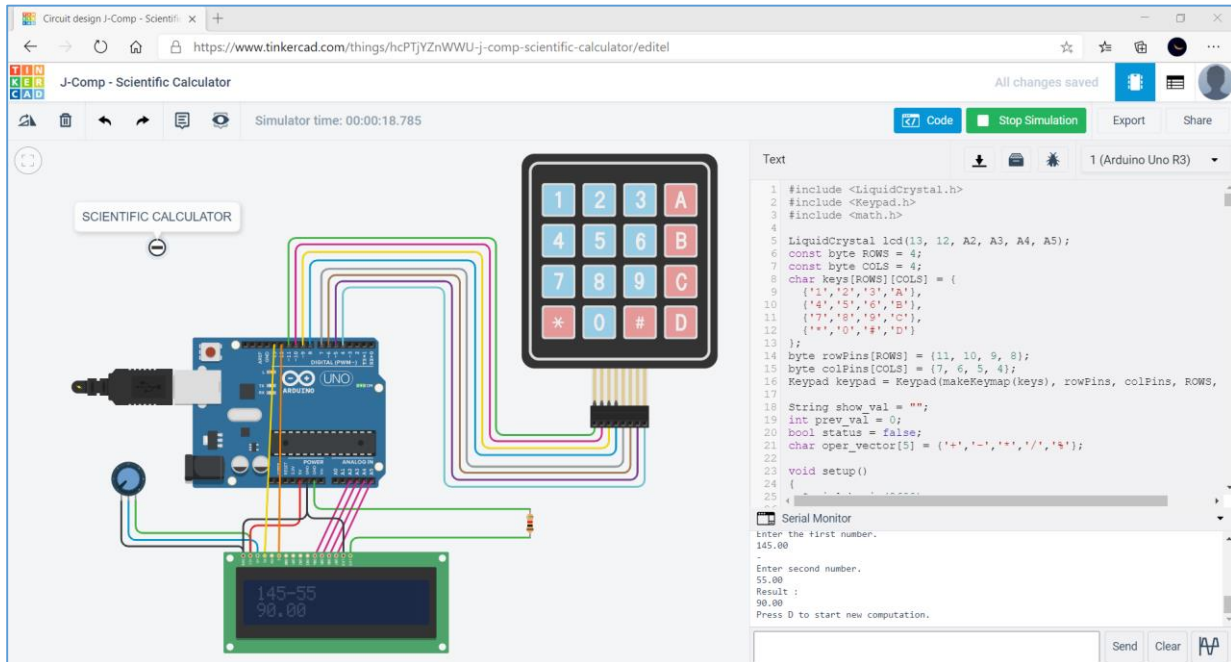
Option Selection



Option 1 - Addition



Option 2 - Subtraction



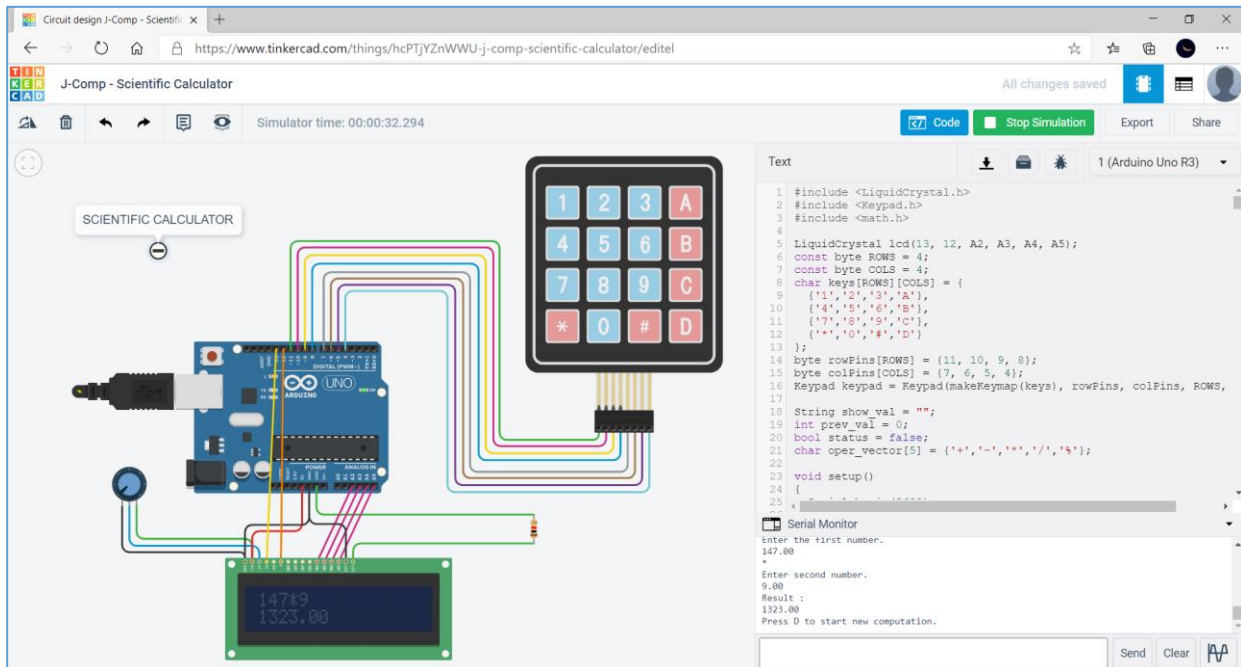
The screenshot shows a Tinkercad simulation of a scientific calculator circuit. The circuit consists of an Arduino Uno microcontroller, a 4x4 keypad, and an LCD display. The keypad is connected to the Arduino via a breadboard. The LCD display shows the result of a subtraction: 145 - 55 = 90.00. The code on the right is as follows:

```
1 #include <LiquidCrystal.h>
2 #include <Keypad.h>
3 #include <math.h>
4
5 LiquidCrystal lcd(13, 12, A2, A3, A4, A5);
6 const byte ROWS = 4;
7 const byte COLS = 4;
8 char keys[ROWS][COLS] = {
9   {'1','2','3','A'},
10  {'4','5','6','B'},
11  {'7','8','9','C'},
12  {'*','0','#','D'}
13 };
14 byte rowPins[ROWS] = {11, 10, 9, 8};
15 byte colPins[COLS] = {7, 6, 5, 4};
16 Keypad keypad = Keypad(makeKeymap(keys), rowPins, colPins, ROWS,
17                          COLS);
18 String show_val = "";
19 int prev_val = 0;
20 bool status = false;
21 char oper_vector[5] = {'+', '-', '*', '/', '%'};
22
23 void setup()
24 {
25   // ...
26 }
```

The Serial Monitor shows the following output:

```
Enter the first number.
145.00
Enter second number.
55.00
Result :
90.00
Press D to start new computation.
```

Option 3 - Multiplication



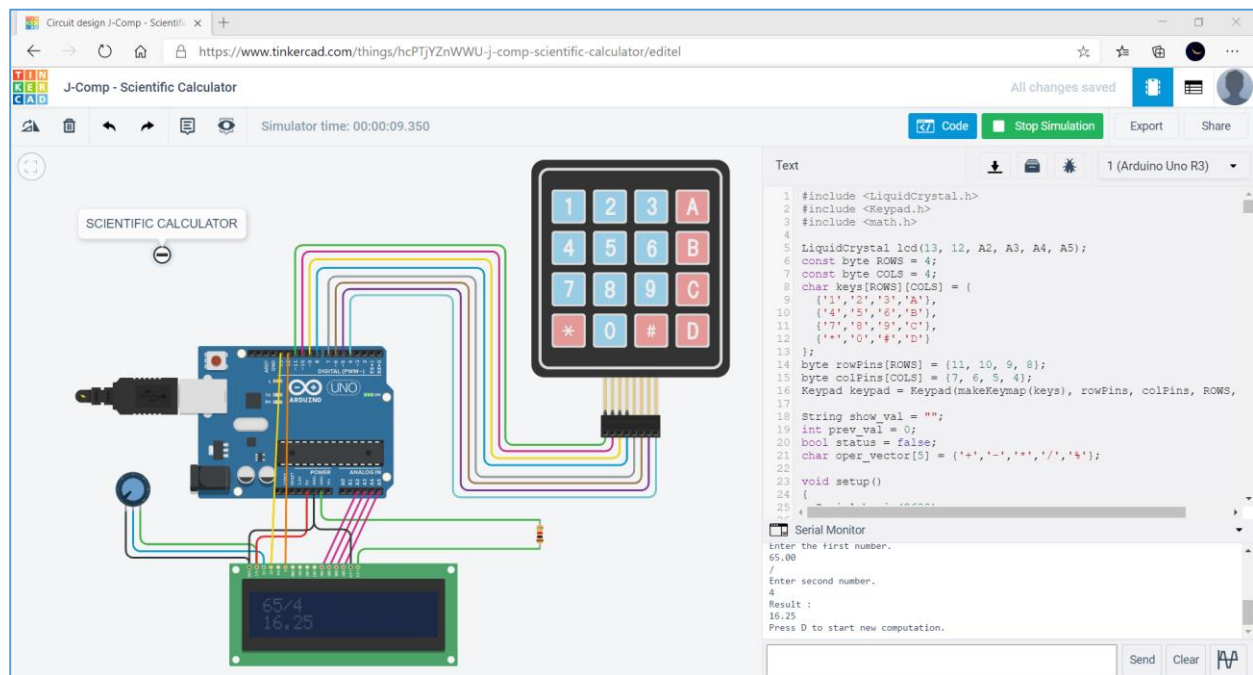
The screenshot shows a Tinkercad simulation of a scientific calculator circuit. The circuit consists of an Arduino Uno microcontroller, a 4x4 keypad, and an LCD display. The keypad is connected to the Arduino via a breadboard. The LCD display shows the result of a multiplication: 147 * 9 = 1323.00. The code on the right is as follows:

```
1 #include <LiquidCrystal.h>
2 #include <Keypad.h>
3 #include <math.h>
4
5 LiquidCrystal lcd(13, 12, A2, A3, A4, A5);
6 const byte ROWS = 4;
7 const byte COLS = 4;
8 char keys[ROWS][COLS] = {
9   {'1','2','3','A'},
10  {'4','5','6','B'},
11  {'7','8','9','C'},
12  {'*','0','#','D'}
13 };
14 byte rowPins[ROWS] = {11, 10, 9, 8};
15 byte colPins[COLS] = {7, 6, 5, 4};
16 Keypad keypad = Keypad(makeKeymap(keys), rowPins, colPins, ROWS,
17                          COLS);
18 String show_val = "";
19 int prev_val = 0;
20 bool status = false;
21 char oper_vector[5] = {'+', '-', '*', '/', '%'};
22
23 void setup()
24 {
25   // ...
26 }
```

The Serial Monitor shows the following output:

```
Enter the first number.
147.00
Enter second number.
9.00
Result :
1323.00
Press D to start new computation.
```

Option 4 – Division



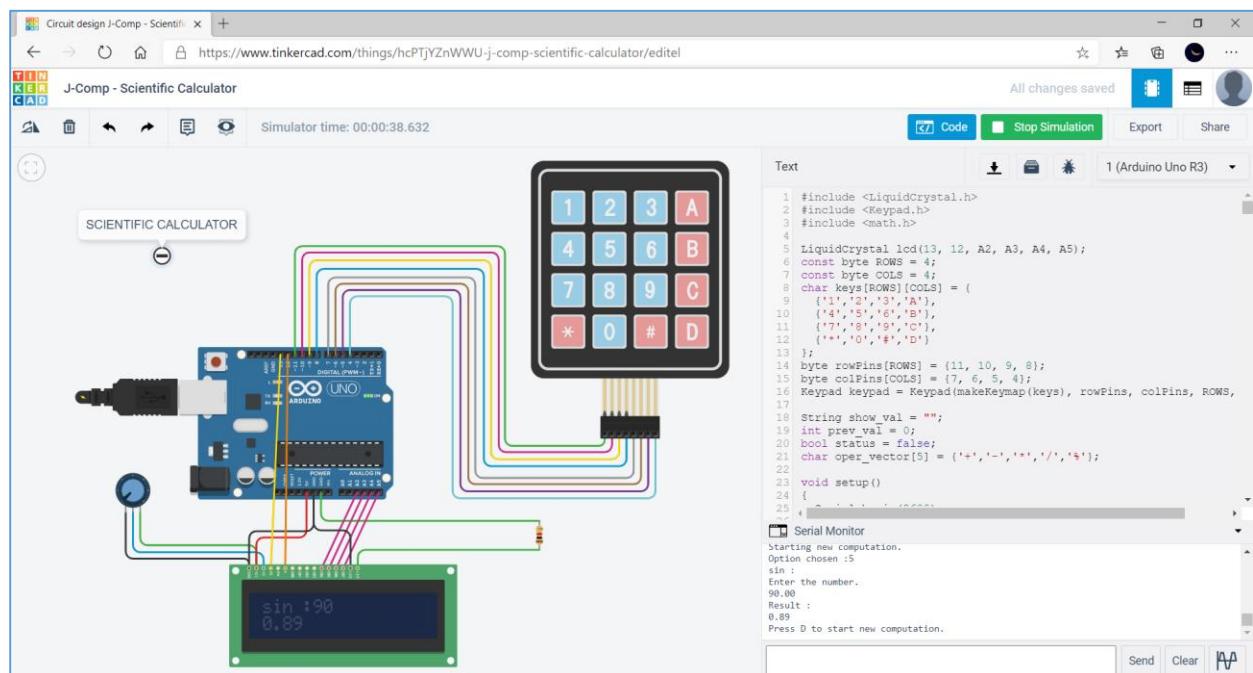
The screenshot shows the Tinkercad web interface for a project titled "J-Comp - Scientific Calculator". The circuit consists of an Arduino Uno R3 connected to a 4x4 keypad and an LCD display. The keypad has buttons for digits 1-9, 0, #, and letters A, B, C, D. The LCD display shows the calculation "65/4" and the result "16.25". The code on the right implements a division function.

```
1 #include <LiquidCrystal.h>
2 #include <Keypad.h>
3 #include <math.h>
4
5 LiquidCrystal lcd(13, 12, A2, A3, A4, A5);
6 const byte ROWS = 4;
7 const byte COLS = 4;
8 char keys[ROWS][COLS] = {
9   {'1','2','3','A'},
10  {'4','5','6','B'},
11  {'7','8','9','C'},
12  {'*','0','#','D'}
13 };
14 byte rowPins[ROWS] = {11, 10, 9, 8};
15 byte colPins[COLS] = {7, 6, 5, 4};
16 Keypad keypad = Keypad(makeKeymap(keys), rowPins, colPins, ROWS, COLS);
17
18 String show_val = "";
19 int prev_val = 0;
20 bool status = false;
21 char oper_vector[5] = {'+', '-', '*', '/', '='};
22
23 void setup()
24 {
25   lcd.begin(16, 2);
26   lcd.print("Enter the first number.");
27   delay(2000);
28   lcd.print("Enter second number.");
29   delay(2000);
30   lcd.print("Result :");
31   delay(2000);
32   lcd.print("Press D to start new computation.");
33 }
```

Serial Monitor

Enter the first number.
65.00
/ Enter second number.
4
Result :
16.25
Press D to start new computation.

Option 5 – Sine function



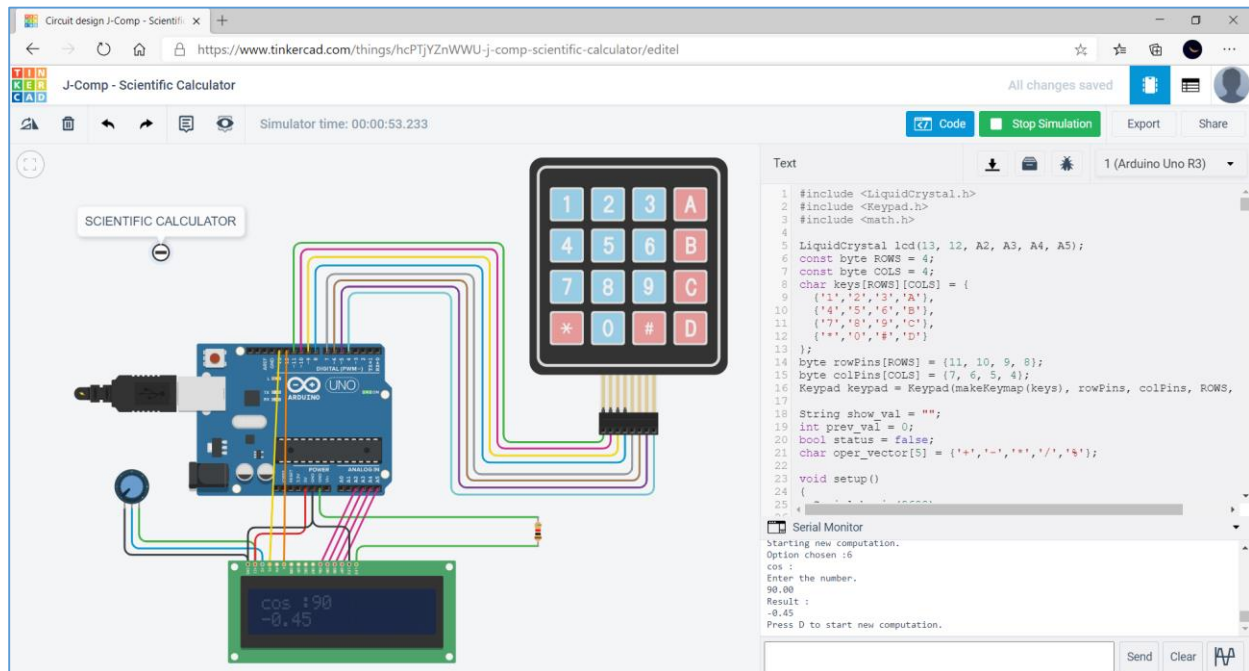
The screenshot shows the Tinkercad web interface for a project titled "J-Comp - Scientific Calculator". The circuit consists of an Arduino Uno R3 connected to a 4x4 keypad and an LCD display. The keypad has buttons for digits 1-9, 0, #, and letters A, B, C, D. The LCD display shows the calculation "sin :90" and the result "0.89". The code on the right implements a sine function.

```
1 #include <LiquidCrystal.h>
2 #include <Keypad.h>
3 #include <math.h>
4
5 LiquidCrystal lcd(13, 12, A2, A3, A4, A5);
6 const byte ROWS = 4;
7 const byte COLS = 4;
8 char keys[ROWS][COLS] = {
9   {'1','2','3','A'},
10  {'4','5','6','B'},
11  {'7','8','9','C'},
12  {'*','0','#','D'}
13 };
14 byte rowPins[ROWS] = {11, 10, 9, 8};
15 byte colPins[COLS] = {7, 6, 5, 4};
16 Keypad keypad = Keypad(makeKeymap(keys), rowPins, colPins, ROWS, COLS);
17
18 String show_val = "";
19 int prev_val = 0;
20 bool status = false;
21 char oper_vector[5] = {'+', '-', '*', '/', '='};
22
23 void setup()
24 {
25   lcd.begin(16, 2);
26   lcd.print("Starting new computation.");
27   delay(2000);
28   lcd.print("Option chosen :5");
29   delay(2000);
30   lcd.print("sin :");
31   delay(2000);
32   lcd.print("Enter the number.");
33   delay(2000);
34   lcd.print("90.00");
35   delay(2000);
36   lcd.print("Result :");
37   delay(2000);
38   lcd.print("0.89");
39   delay(2000);
40   lcd.print("Press D to start new computation.");
41 }
```

Serial Monitor

Starting new computation.
Option chosen :5
sin :
Enter the number.
90.00
Result :
0.89
Press D to start new computation.

Option 6 – Cosine function



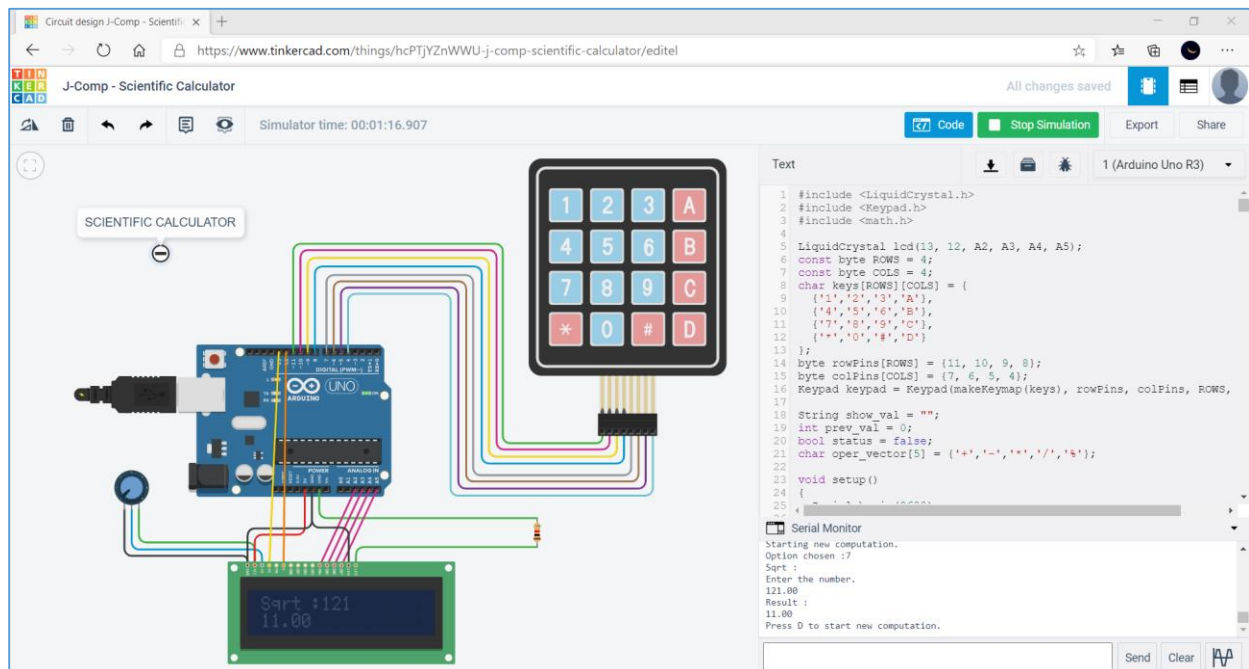
The screenshot shows the Tinkercad web interface for a project titled "J-Comp - Scientific Calculator". The circuit consists of an Arduino Uno R3 connected to a Keypad and a LiquidCrystal display. The display shows "cos :190" and "-0.45". The code on the right implements the cosine function using the `math.h` library.

```
1 #include <LiquidCrystal.h>
2 #include <Keypad.h>
3 #include <math.h>
4
5 LiquidCrystal lcd(13, 12, A2, A3, A4, A5);
6 const byte ROWS = 4;
7 const byte COLS = 4;
8 char keys[ROWS][COLS] = {
9   {'1','2','3','A'},
10  {'4','5','6','B'},
11  {'7','8','9','C'},
12  {'*','0','#','D'}
13 };
14 byte rowPins[ROWS] = {11, 10, 9, 8};
15 byte colPins[COLS] = {7, 6, 5, 4};
16 Keypad keypad = Keypad(makeKeymap(keys), rowPins, colPins, ROWS, COLS);
17
18 String show_val = "";
19 int prev_val = 0;
20 bool status = false;
21 char oper_vector[5] = {'+', '-', '*', '/', '%'};
22
23 void setup()
24 {
25   // ...
26 }
```

Serial Monitor output:

```
Starting new computation.
Option chosen :6
cos :
Enter the number.
90.00
Result :
-0.45
Press D to start new computation.
```

Option 7 – Square root of a number



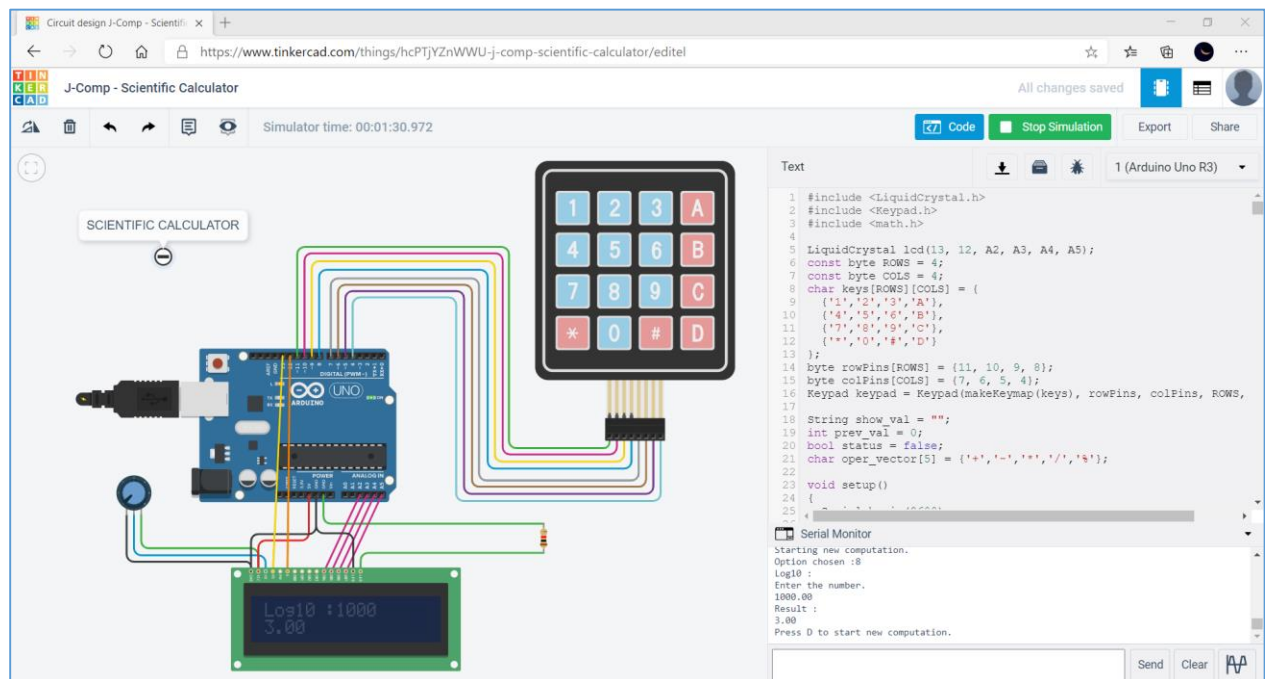
The screenshot shows the Tinkercad web interface for a project titled "J-Comp - Scientific Calculator". The circuit consists of an Arduino Uno R3 connected to a Keypad and a LiquidCrystal display. The display shows "Sqrt :121" and "11.00". The code on the right implements the square root function using the `math.h` library.

```
1 #include <LiquidCrystal.h>
2 #include <Keypad.h>
3 #include <math.h>
4
5 LiquidCrystal lcd(13, 12, A2, A3, A4, A5);
6 const byte ROWS = 4;
7 const byte COLS = 4;
8 char keys[ROWS][COLS] = {
9   {'1','2','3','A'},
10  {'4','5','6','B'},
11  {'7','8','9','C'},
12  {'*','0','#','D'}
13 };
14 byte rowPins[ROWS] = {11, 10, 9, 8};
15 byte colPins[COLS] = {7, 6, 5, 4};
16 Keypad keypad = Keypad(makeKeymap(keys), rowPins, colPins, ROWS, COLS);
17
18 String show_val = "";
19 int prev_val = 0;
20 bool status = false;
21 char oper_vector[5] = {'+', '-', '*', '/', '%'};
22
23 void setup()
24 {
25   // ...
26 }
```

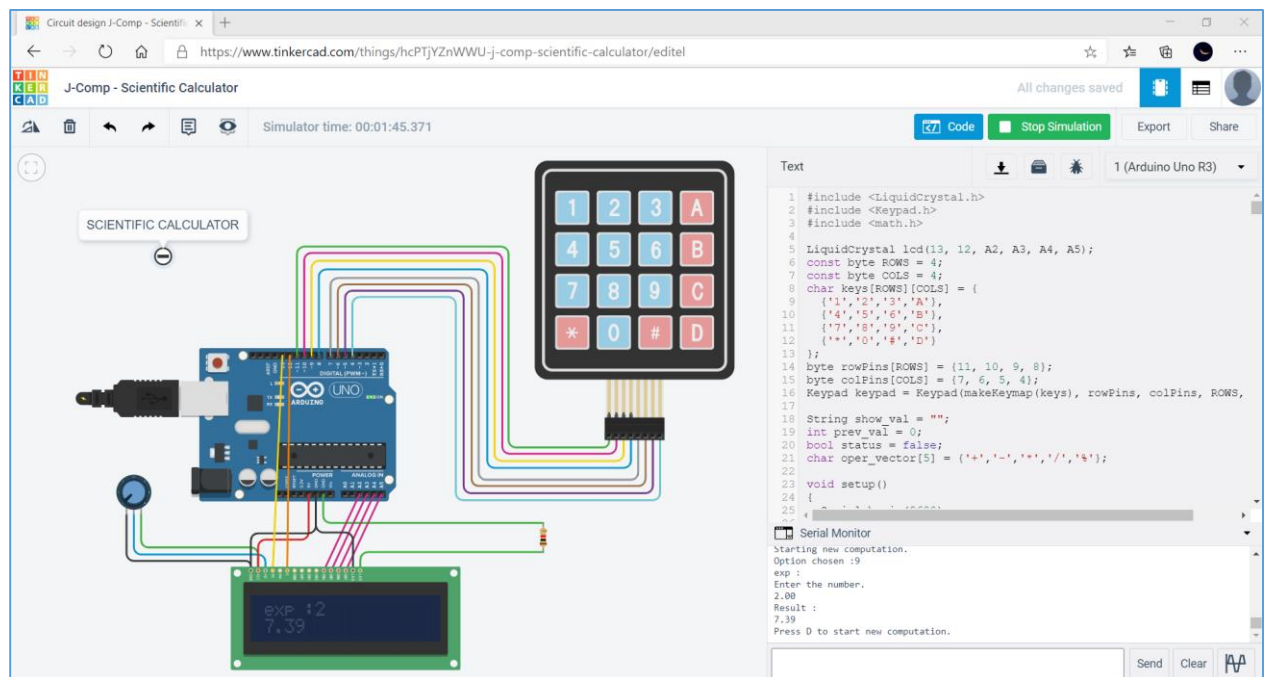
Serial Monitor output:

```
Starting new computation.
Option chosen :7
Sqrt :
Enter the number.
121.00
Result :
11.00
Press D to start new computation.
```

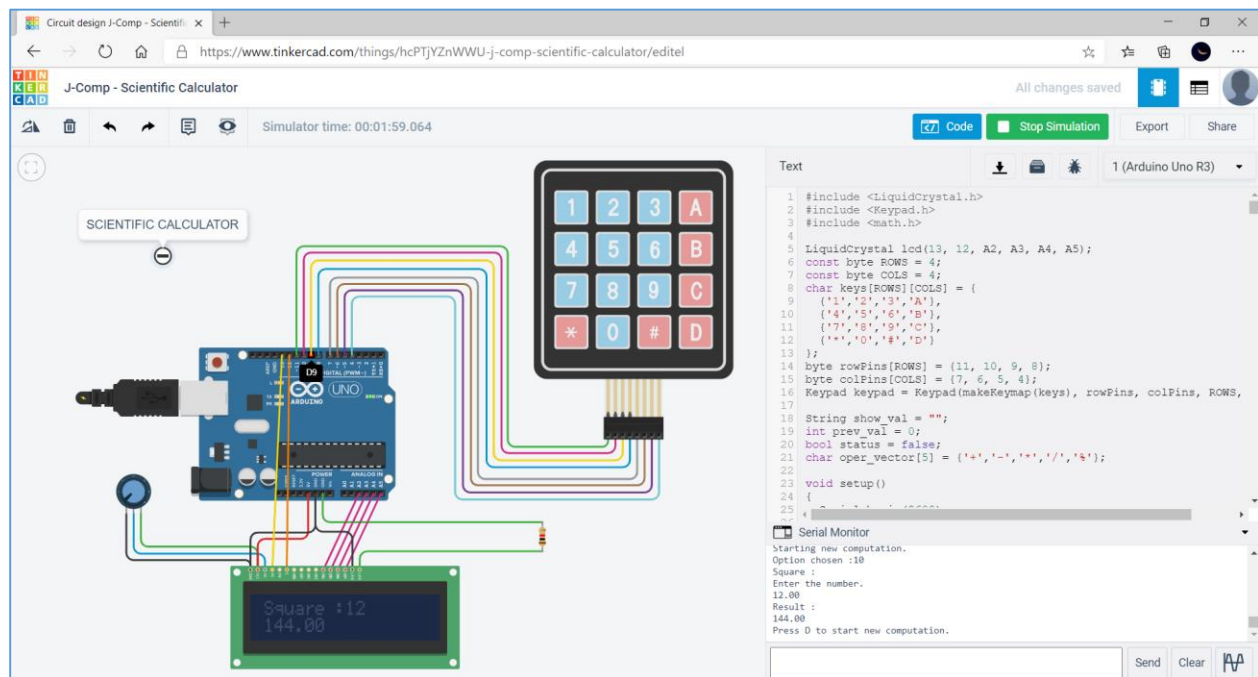
Option 8 – Log10



Option 9 – Exponential (e^x)



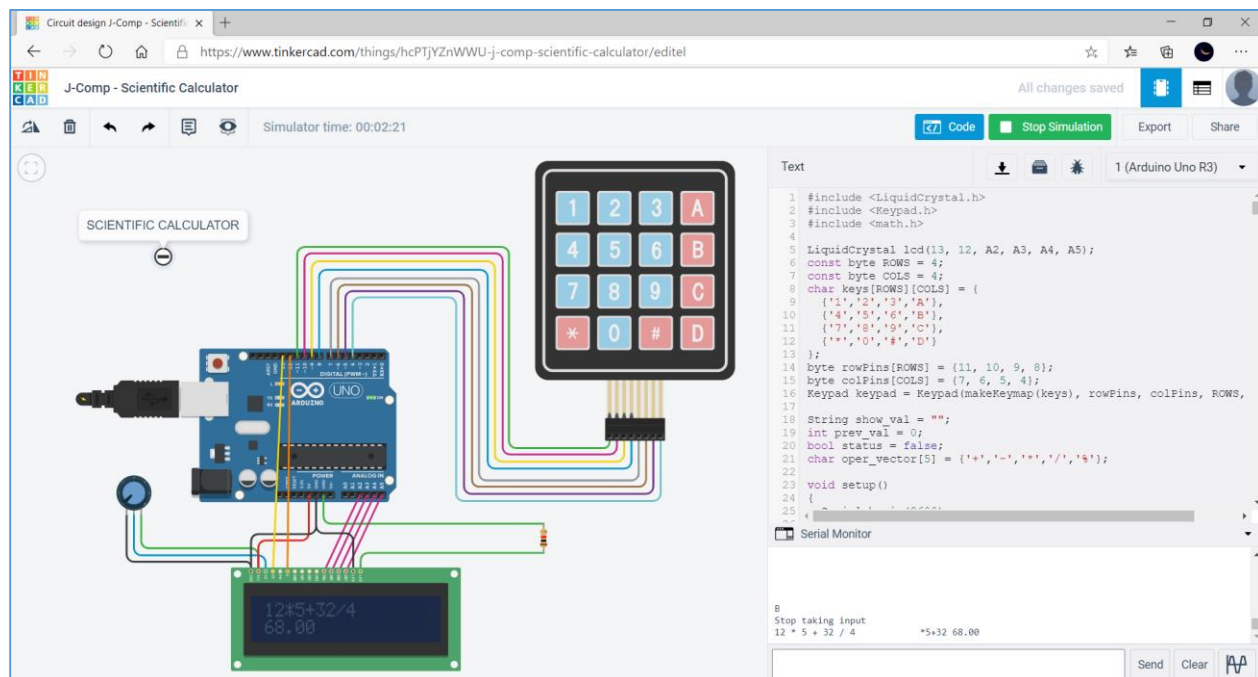
Option 10 – Square of a number



The screenshot shows the Tinkercad web interface for a project titled "J-Comp - Scientific Calculator". The circuit consists of an Arduino Uno R3 connected to a keypad and a 16x2 LCD display. The keypad has buttons for digits 0-9, a decimal point, a plus-minus sign, and function keys A, B, C, and D. The LCD displays "Square :12" and "144.00". The code on the right implements a program to calculate the square of a number entered on the keypad.

```
1 #include <LiquidCrystal.h>
2 #include <Keypad.h>
3 #include <math.h>
4
5 LiquidCrystal lcd(13, 12, A2, A3, A4, A5);
6 const byte ROWS = 4;
7 const byte COLS = 4;
8 char keys[ROWS][COLS] = {
9   {'1','2','3','A'},
10  {'4','5','6','B'},
11  {'7','8','9','C'},
12  {'*','0','#','D'}
13 };
14 byte rowPins[ROWS] = {11, 10, 9, 8};
15 byte colPins[COLS] = {7, 6, 5, 4};
16 Keypad keypad = Keypad(makeKeymap(keys), rowPins, colPins, ROWS, COLS);
17
18 String show_val = "";
19 int prev_val = 0;
20 bool status = false;
21 char oper_vector[5] = {'+', '-', '*', '/', '%'};
22
23 void setup()
24 {
25   lcd.begin(16, 2);
26   lcd.print("Square :");
27 }
28
29 void loop()
30 {
31   char key = keypad.getKey();
32   if (key == '\0') return;
33   if (key == '+') {
34     show_val = show_val + key;
35     prev_val = 0;
36     status = false;
37   } else if (key == '-') {
38     show_val = show_val + key;
39     prev_val = 0;
40     status = false;
41   } else if (key == '*') {
42     show_val = show_val + key;
43     prev_val = 0;
44     status = false;
45   } else if (key == '/') {
46     show_val = show_val + key;
47     prev_val = 0;
48     status = false;
49   } else if (key == '%') {
50     show_val = show_val + key;
51     prev_val = 0;
52     status = false;
53   } else if (key == 'A') {
54     show_val = show_val + key;
55     prev_val = 0;
56     status = false;
57   } else if (key == 'B') {
58     show_val = show_val + key;
59     prev_val = 0;
60     status = false;
61   } else if (key == 'C') {
62     show_val = show_val + key;
63     prev_val = 0;
64     status = false;
65   } else if (key == 'D') {
66     show_val = show_val + key;
67     prev_val = 0;
68     status = false;
69   } else if (key == '0') {
70     show_val = show_val + key;
71     prev_val = 0;
72     status = false;
73   } else if (key == '1') {
74     show_val = show_val + key;
75     prev_val = 0;
76     status = false;
77   } else if (key == '2') {
78     show_val = show_val + key;
79     prev_val = 0;
80     status = false;
81   } else if (key == '3') {
82     show_val = show_val + key;
83     prev_val = 0;
84     status = false;
85   } else if (key == '4') {
86     show_val = show_val + key;
87     prev_val = 0;
88     status = false;
89   } else if (key == '5') {
90     show_val = show_val + key;
91     prev_val = 0;
92     status = false;
93   } else if (key == '6') {
94     show_val = show_val + key;
95     prev_val = 0;
96     status = false;
97   } else if (key == '7') {
98     show_val = show_val + key;
99     prev_val = 0;
100    status = false;
101  } else if (key == '8') {
102    show_val = show_val + key;
103    prev_val = 0;
104    status = false;
105  } else if (key == '9') {
106    show_val = show_val + key;
107    prev_val = 0;
108    status = false;
109  } else if (key == '.') {
110    show_val = show_val + key;
111    prev_val = 0;
112    status = false;
113  } else if (key == '=') {
114    prev_val = show_val.toInt();
115    show_val = "";
116    status = true;
117  }
118
119  if (status) {
120    int result = prev_val * prev_val;
121    show_val = result;
122    status = false;
123  }
124
125  lcd.setCursor(0, 1);
126  lcd.print(show_val);
127 }
```

Option 11 - BODMAS



The screenshot shows the Tinkercad web interface for a project titled "J-Comp - Scientific Calculator". The circuit consists of an Arduino Uno R3 connected to a keypad and a 16x2 LCD display. The keypad has buttons for digits 0-9, a decimal point, a plus-minus sign, and function keys A, B, C, and D. The LCD displays "12*5+32/4" and "68.00". The code on the right implements a program to calculate the result of a BODMAS expression entered on the keypad.

```
1 #include <LiquidCrystal.h>
2 #include <Keypad.h>
3 #include <math.h>
4
5 LiquidCrystal lcd(13, 12, A2, A3, A4, A5);
6 const byte ROWS = 4;
7 const byte COLS = 4;
8 char keys[ROWS][COLS] = {
9   {'1','2','3','A'},
10  {'4','5','6','B'},
11  {'7','8','9','C'},
12  {'*','0','#','D'}
13 };
14 byte rowPins[ROWS] = {11, 10, 9, 8};
15 byte colPins[COLS] = {7, 6, 5, 4};
16 Keypad keypad = Keypad(makeKeymap(keys), rowPins, colPins, ROWS, COLS);
17
18 String show_val = "";
19 int prev_val = 0;
20 bool status = false;
21 char oper_vector[5] = {'+', '-', '*', '/', '%'};
22
23 void setup()
24 {
25   lcd.begin(16, 2);
26   lcd.print("12*5+32/4");
27 }
28
29 void loop()
30 {
31   char key = keypad.getKey();
32   if (key == '\0') return;
33   if (key == '+') {
34     show_val = show_val + key;
35     prev_val = 0;
36     status = false;
37   } else if (key == '-') {
38     show_val = show_val + key;
39     prev_val = 0;
40     status = false;
41   } else if (key == '*') {
42     show_val = show_val + key;
43     prev_val = 0;
44     status = false;
45   } else if (key == '/') {
46     show_val = show_val + key;
47     prev_val = 0;
48     status = false;
49   } else if (key == '%') {
50     show_val = show_val + key;
51     prev_val = 0;
52     status = false;
53   } else if (key == 'A') {
54     show_val = show_val + key;
55     prev_val = 0;
56     status = false;
57   } else if (key == 'B') {
58     show_val = show_val + key;
59     prev_val = 0;
60     status = false;
61   } else if (key == 'C') {
62     show_val = show_val + key;
63     prev_val = 0;
64     status = false;
65   } else if (key == 'D') {
66     show_val = show_val + key;
67     prev_val = 0;
68     status = false;
69   } else if (key == '0') {
70     show_val = show_val + key;
71     prev_val = 0;
72     status = false;
73   } else if (key == '1') {
74     show_val = show_val + key;
75     prev_val = 0;
76     status = false;
77   } else if (key == '2') {
78     show_val = show_val + key;
79     prev_val = 0;
80     status = false;
81   } else if (key == '3') {
82     show_val = show_val + key;
83     prev_val = 0;
84     status = false;
85   } else if (key == '4') {
86     show_val = show_val + key;
87     prev_val = 0;
88     status = false;
89   } else if (key == '5') {
90     show_val = show_val + key;
91     prev_val = 0;
92     status = false;
93   } else if (key == '6') {
94     show_val = show_val + key;
95     prev_val = 0;
96     status = false;
97   } else if (key == '7') {
98     show_val = show_val + key;
99     prev_val = 0;
100    status = false;
101  } else if (key == '8') {
102    show_val = show_val + key;
103    prev_val = 0;
104    status = false;
105  } else if (key == '9') {
106    show_val = show_val + key;
107    prev_val = 0;
108    status = false;
109  } else if (key == '.') {
110    show_val = show_val + key;
111    prev_val = 0;
112    status = false;
113  } else if (key == '=') {
114    prev_val = show_val.toInt();
115    show_val = "";
116    status = true;
117  }
118
119  if (status) {
120    int result = prev_val * prev_val;
121    show_val = result;
122    status = false;
123  }
124
125  lcd.setCursor(0, 1);
126  lcd.print(show_val);
127 }
```