Final Pseudo Code:

Include the <Keypad.h> library.

(Declare function prototypes for the following **programmer defined functions**, reference Chapter 5 lecture slides #7-#14)
Declare a function prototype to **checkHit**. This function will take one **integer** input, **lightIndex**, and provides **no** output.
Declare a function prototype to **playPink**. This function will take **no input**, and this function provides **no output**.
Declare a function prototype to **showScore**. This function will take **no input**, and this function provides **no output**.

(Declare the following constant global variables, reference Chapter 13 lecture slides #6. Please also reference the SanSmart Tutorial page 102.)
Declare a constant byte variable, **ROWS**, and initialize its value to 4.
Declare a constant byte variable, **COLS**, and initialize its value to 4.

(Map the 4x4 keys on the keypad to a 4x4 matrix. Reference Chapter 6 slides #52 - #70. Please also reference the SanSmart Tutorial page 102.)
Declare a matrix of character variables with **ROWS** x **COLS** elements, **keys**, and initialize the values to represent the keys on the keypad.

(The following global variables are from SanSmart Tutorial page 102.)

```
byte rowPins[ROWS] = {9, 8, 7, 6};
byte colPins[COLS] = {5, 4, 3, 2};
Keypad pad = Keypad(makeKeymap(keys),rowPins, colPins, ROWS, COLS);
```

Declare a constant integer variable, **BUZPIN**, and initialize the value to 10.
Declare a constant array of integer variables with **9** elements, **ledPin**, and initialize the values to 0, 11, 12, 13, 16, 17, 18, 19, and 15.

(Declare the following global variables. Reference Storage Classes and Scope from Chapter 5 lecture slides #25 - #33.)
Declare an integer variable, **gameStart**, and initialize the value to 0.
Declare an unsigned long variable, **startTime**, and initialize the value to 0.
Declare an unsigned long variable, **currentTime**, and initialize the value to 0.
Declare an integer variable, **currentLight**, and initialize the value to 0.
Declare an unsigned long variable, **delta**, and initialize the value to 1000.
Declare an integer variable, **hit**, and initialize the value to 0.
Declare an integer variable, **score**, and initialize the value to 0.

(The setup function runs once when you press reset.)
void setup()
{
(Reference how to enable the serial debug commands from SainSmart UNO Starter Kits Tutorials.pdf page #17.)

Set serial baud rate for the Serial Monitor window to 9600.
(Reference how to set pin mode to output from SainSmart UNO Starter Kits Tutorials.pdf page #21.)
Write a "for loop" to loop integer **i** from 1 to 8 to set pins in the **ledPin** array to the **OUTPUT** mode.
}

(The loop function runs over and over again forever.)
void loop()
{
Declare a local character variable, **key.**
Call the **pad.getKey** function and save the function return value to **key**.

If (the value of **key** is not equal to **NO_KEY**)
{
Call the **Serial.println** function and provide **key** as the function input.
Switch (based on the value of **key**)
{
Case '7': call the **checkHit** function and provide 1 as the function input.
Case '4': call the **checkHit** function and provide 2 as the function input.
Case '1': call the **checkHit** function and provide 3 as the function input.
Case '2': call the **checkHit** function and provide 4 as the function input.
Case '3': call the **checkHit** function and provide 5 as the function input.
Case '6': call the **checkHit** function and provide 6 as the function input.
Case '9': call the **checkHit** function and provide 7 as the function input.
Case '8': call the **checkHit** function and provide 8 as the function input.
Case 'A':
Set **score** to 0.
Set **gameStart** to 1.
Set **delta** to 1000.
Set **currentLight** to 1.
Call the **digitalWrite** function and provide **ledPin** array index **currentLight** and **HIGH** as function inputs.
Call the **playPink** function.
Call the Arduino built-in **millis** function and save the function return value to **startTime**.
Case 'D':
Set **gameStart** to 0.
Call the **digitalWrite** function and provide **ledPin** array index **currentLight** and **LOW** as function inputs.
Call the **showScore** function.
Case '*':
For (loop integer **i** from 1 to 8)
Call the **digitalWrite** function and provide **ledPin** array index **i** and **HIGH** as function inputs.
Case '0':
For (loop integer **i** from 1 to 8)
Call the **digitalWrite** function and provide **ledPin** array index **i** and **LOW** as function inputs.

```
      In the default case:  break.
    } // end of the switch statement
  } // end of if receive a key press
  Else if (the value of gameStart is a non-zero value)
  {
    Call the millis function and save the function return value to currentTime.
    If (the value of (currentTime minus startTime) is larger or equal to delta)
    {
      Call the digitalWrite function and provide ledPin array index currentLight and LOW as function inputs.
      Set hit to 0.
      Increment currentLight by 1.
      If (the value of currentLight is greater than 8)
      {
        Set currentLight to 1.
        Modify delta to: delta multiplied by 90 and divided by 100.
      }
      Call the digitalWrite function and provide ledPin array index currentLight and HIGH as function inputs.
      Call the playPink function.
      Set startTime to currentTime.
    }
  } // end of else if the game started
} // end of loop forever function
```

(The function body for the following **programmer defined functions** can be referenced from Chapter 5 lecture slides #7-#14)

```
void checkHit(int lightIndex)
{
  If (the value of currentLight is equal to the value of lightIndex AND the value of hit is equal to 0)
  {
    Set hit to 1.
    Call the digitalWrite function and provide ledPin array index currentLight and LOW as function inputs.
    Call the tone function and provide buzPin, 262, and 25 as function inputs.
    Call the delay function and provide 25 as the function input.
    Increment score by 1.
  }
} // end of checkHit function

void playPink(()
{
  Switch (based on the value of currentLight)
  {
    Case 1:
```

Call the **tone** function and provide **buzPin**, 1109, and 25 as the function inputs.
Call the **delay** function and provide 25 as the function input.
Call the **tone** function and provide **buzPin**, 1175, and 75 as the function inputs.
Call the **delay** function and provide 75 as the function input.

Case 2:
Call the **tone** function and provide **buzPin**, 1319, and 25 as the function inputs.
Call the **delay** function and provide 25 as the function input.
Call the **tone** function and provide **buzPin**, 1397, and 75 as the function inputs.
Call the **delay** function and provide 75 as the function input.

Case 3:
Call the **tone** function and provide **buzPin**, 1109, and 25 as the function inputs.
Call the **delay** function and provide 25 as the function input.
Call the **tone** function and provide **buzPin**, 1175, and 75 as the function inputs.
Call the **delay** function and provide 75 as the function input.

Case 4:
Call the **tone** function and provide **buzPin**, 1319, and 25 as the function inputs.
Call the **delay** function and provide 25 as the function input.
Call the **tone** function and provide **buzPin**, 1397, and 75 as the function inputs.
Call the **delay** function and provide 75 as the function input.

Case 5:
Call the **tone** function and provide **buzPin**, 1865, and 25 as the function inputs.
Call the **delay** function and provide 25 as the function input.
Call the **tone** function and provide **buzPin**, 1760, and 75 as the function inputs.
Call the **delay** function and provide 75 as the function input.

Case 6:
Call the **tone** function and provide **buzPin**, 1175, and 25 as the function inputs.
Call the **delay** function and provide 25 as the function input.
Call the **tone** function and provide **buzPin**, 1397, and 75 as the function inputs.
Call the **delay** function and provide 75 as the function input.

Case 7:
Call the **tone** function and provide **buzPin**, 1760, and 25 as the function inputs.
Call the **delay** function and provide 25 as the function input.
Call the **tone** function and provide **buzPin**, 1661, and 75 as the function inputs.
Call the **delay** function and provide 75 as the function input.

Case 8:
Call the **tone** function and provide **buzPin**, 1661, and 100 as the function inputs.
Call the **delay** function and provide 100 as the function input.

In the default case: break.

} // end of the switch statement

}

void **showScore**()

{

Call the **delay** function and provide 500 as the function input.
For (loop integer **i** from 0 to less than the value of **score**)
{
Call the **digitalWrite** function and provide **ledPin** array index 1 and **HIGH** as function inputs.
Call the **tone** function and provide **buzPin**, 262, and 50 as the function inputs.
Call the **delay** function and provide 100 as the function input.
Call the **digitalWrite** function and provide **ledPin** array index 1 and **LOW** as function inputs.
Call the **delay** function and provide 250 as the function input.
}
}