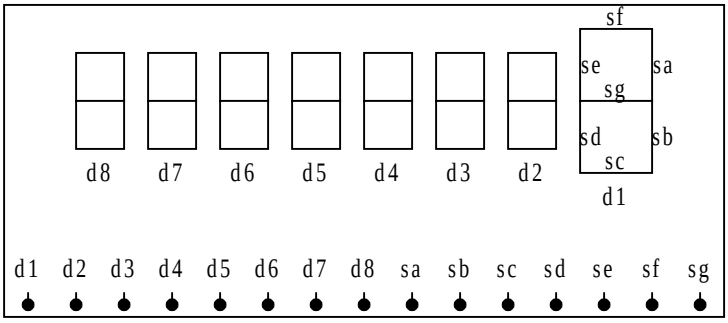
CS/EE 120B

Homework #3 Given 3/6/01. Due 3/13/01

1. Given an 8-digit seven segment display (similar to those used in a calculator) with the schematic as shown below

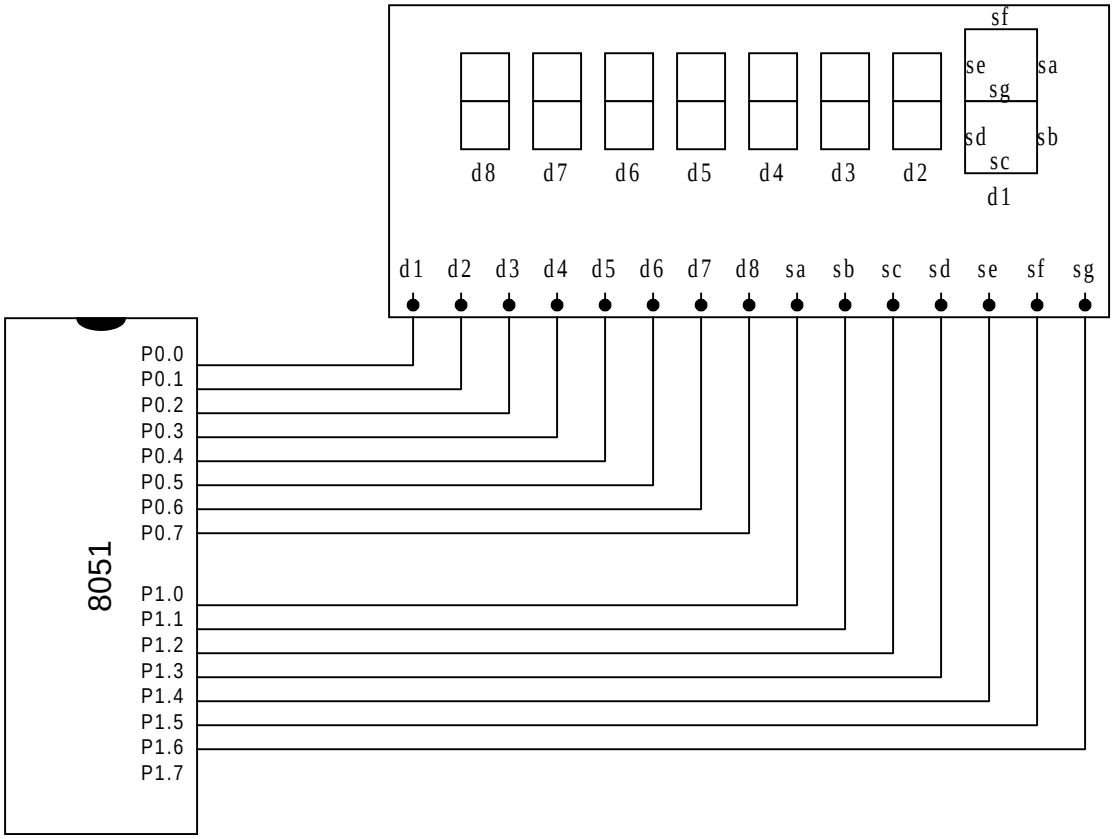


The seven segments, labeled sa to sf, are connected in common across the 8 digits. To turn on a segment for a particular digit, the segment pin (sa to sf) needs to be pulled low and the corresponding digit pin (d1 to d8) must be pulled high.

Draw the schematic to show how the above display can be interfaced with the 8051. Write the C code to display the number 31415926 on the eight digits.

Answer

One possible connection is as follows



The C code to write the number 31415926 to the display is as follows:

```
// define the codes to light up the LEDs for the digits from 0 to 9
// the codes are stored in an array and thus can be retrieved with an index
// a 0 turns on the LED and a 1 turns off the LED
// e.g. 0x52 will display the number 2 because
//    0x52 = x1010010 = xgfedcba, where x=don't care
//    so segments sa, sc, sd, sf, and sg will be on
unsigned char code segment[] =
                        {0x40,0x7c,0x52,0x58,0x2c,0x09,0x21,0x5c,0x00,0x0c};

// bytes to turn on the 8 digits
// a 1 turns on the digit, e.g. 0x01 will turn on the rightmost digit
// and turn off the rest of the digits
unsigned char code digit[] = {0x01,0x02,0x04,0x08,0x10,0x20,0x40,0x80};

for (;;){
   P0 = segment[3];  // get the code for the number 3 and output it to P0
   P1 = digit[7];    // turn on digit 7 (leftmost digit) and turn all the
                     // other digits off
   P0 = segment[1];  // …
   P1 = digit[6];
   P0 = segment[4];
   P1 = digit[5];
   P0 = segment[1];
   P1 = digit[4];
   P0 = segment[5];
   P1 = digit[3];
   P0 = segment[9];
   P1 = digit[2];
   P0 = segment[2];
   P1 = digit[1];
   P0 = segment[6];
   P1 = digit[0];
}
```