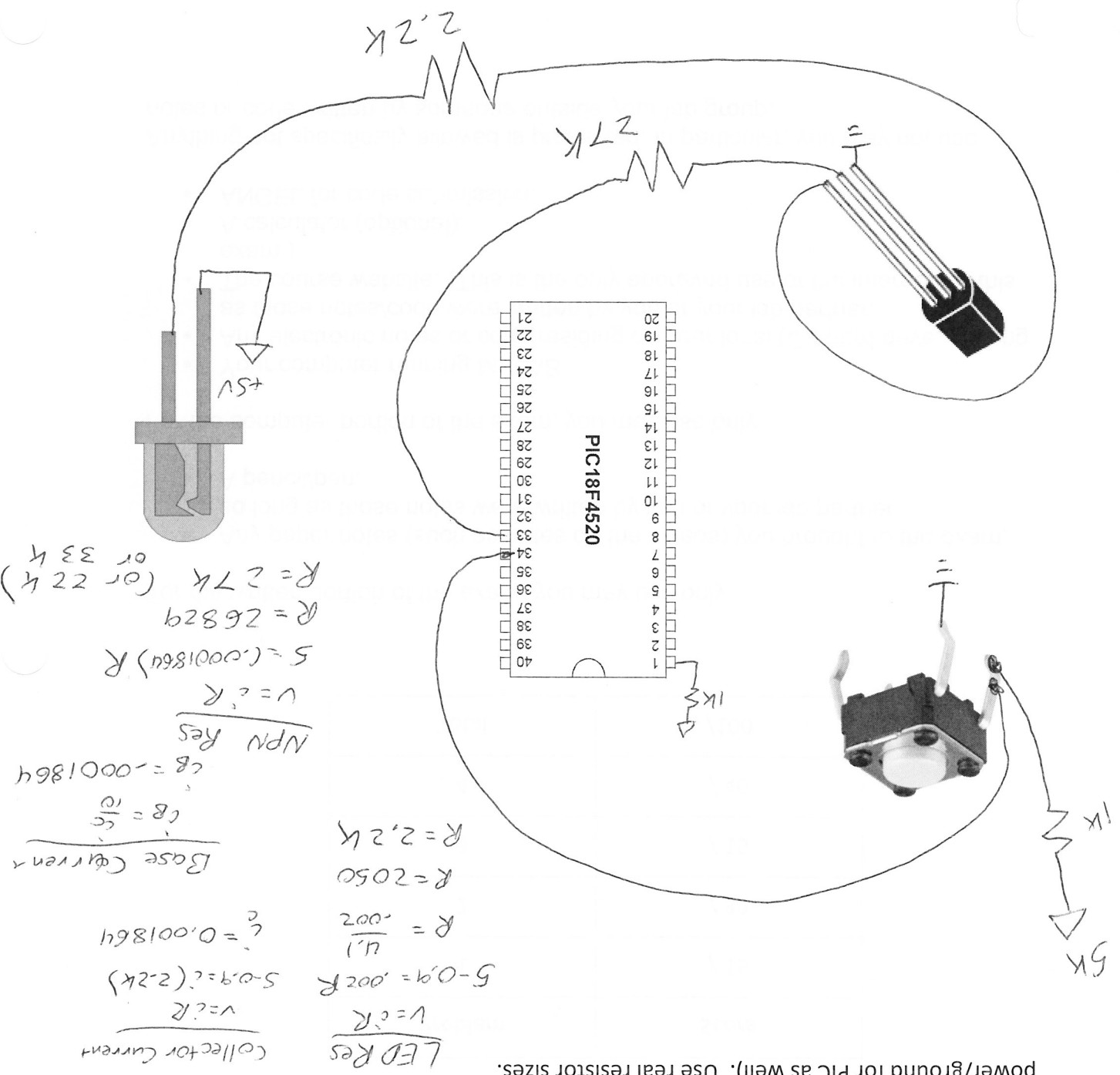


Control an LED using a pushbutton and NPN transistor. Show all resistor sizes necessary with clear labels (showing your work may help with partial credit). Assume the LED is different from the ones we use in class and has a maximum current of 4 mA so we will target using 2 mA of current. Additionally the LED has a 0.9 volt forward voltage drop. The PIC is programmed for RB0 to be an output controlling the LED and RB1 to be an input for the basic switch circuit. The only power source is 5 volts (show power/ground for PIC as well). Use real resistor sizes.



**Problem 2– Short answer
(30 pts)**

2.1) (4 pts) $x = -8$; If x is defined as a char, how would it display as a binary number in the watch window?

11111000

2.2) (4pts) $x = 'A'$ If x is defined as a char, how would it display as a binary number in the watch window?

01000001

2.3) (6 pts) Write the C code to perform the following: create an array, named *allTen*, of 5 int variables where each element in the array is set to 10:

```
int allTen[] = {10,10,10,10,10};
```

2.4) (6 pts) Create an if statement (or switch statement) based on the first element in the array named *allTen*. If the first element is 10 print “The first element is 10” to the screen, otherwise print “The first element is NOT 10” to the screen.

```
if (allTen[0] == 10)
    printf("The first element is 10\n");
else
    printf("The first element is NOT 10\n");
```

2.5) (10 pts) Determine the output of this code:

(ie If you were using the simulator UART capture window, what would appear in the window?)

```
#include <stdio.h>

int g(int a, int b);
void f(int n);

void main()
{
    f(3);
    printf("Goodbye!");
    while(1);
}

void f(int n)
{
    int i,result;
    for ( i=1 ; i<=n ; i++)
    {
        result = g(i,n);
    }
    printf("\nSum = %d\n" , result);
}

int g(int a, int b)
{
    printf("( %d of %d)  ", a,b);
    return a+b;
}
```

```
(1 of 3) (2 of 3) (3 of 3)
Sum = 6
Goodbye!
```

When you finish the written portion of the test, turn it in to receive the computer portion.