Handout 8

`int` variables

8.1 First foray with `int`s

Try the following code:

```
/*
Syntax input/output with int
*/
#include <stdio.h>
#include <math.h>
#include <stdlib.h>

int main()
{
  int input;

  printf("Enter an integer ");
  scanf("%d", &input);
  printf("You entered %d \n", input);
}
```

- What happens if you enter a non-integer?

- Modify the code to take in two `int` variables `input1` and `input2` and prints out `input1+input2`. Then use your code to test what happens to the following operations. Be sure to try a variety of different inputs.

    ```
    input1*input2
    input1/input2
    input1%input2
    ```

- What happens if you compute `0.3*input1` with `int` type variables?

Moral: Be careful with `int` variables!!

8.2   Lists of inputs

Play around for a bit with this code:

```
/*
compute sum of 10 integers
*/
#include <stdio.h>
#include <math.h>
#include <stdlib.h>

int main()
{
  int input=0, sum=0;
  int k=1;

  printf("Enter 10 integers:\n");
  while(k<=10)
  {
    sum = sum + input;
    k++;
    scanf("%d", &input);
  }
  printf("The sum is %d \n", sum);
}
```

1. You can enter in all 10 inputs at once by entering this on the command line:

```
$ ./a.out <<< "1 2 3 4 5 6 7 8 9 10"
```

2. Notice that the command

```
sum = sum + input;
```

comes before the command

```
scanf("%d", &input);
```

Explain the logic of how the code is organized.

3. Modify the code so that it takes in a list of numbers of any length. The numbers we are interested in are all greater than or equal to zero. The list of numbers ends with −1. For example

```
3 2 56 1 8 0 2 6 3 24 −1
```

You want your code to add up all of the numbers **except** for the −1.

8.3 Homework: `data.c`

Write a code `data.c` as follows.

- The input is a non-negative list of integers, followed by −1.

- The output reports the number of terms in the list, the sum of terms in the list, the largest number in the list, and the smallest number in the list.

For example: if the input is

```
1 2 3 4 5 6 7 8 9 10 -1
```

then the output should read

```
number of terms: 10
sum of terms: 55
smallest term: 1
largest term: 10
```

Important: All of your variables should be type `int`.

8.4 Challenge problems

1. Modify your code `data.c` to also compute the average. (Note that the average might not be an integer!)

2. Write a code the finds Pythagorean triples. The input for the code is an integer a. The output are two more integers b and c such that $a^2 + b^2 = c^2$. Assume that the input a satisfies $a \geq 3$.