

More examples of problems involving loops:

A. Fixed repetition loops:

1. The user enters two integers x and y and the program prints out x raised to the y power.
2. The program prints out the first 8 powers of 2 using a loop. (i.e.: 2 4 8...256)

B: User enters a flag:

1. The program sums up the values the user inputs. The user indicates they are finished by entering -9999.
2. The program calculates the average of the values the user inputs. The user indicates they are finished by entering 0.

Question: what two things need to be calculated by the loop in order to then compute the average?

3. The program finds the smallest or the largest or the second smallest of the values the user inputs. The user indicates they are finished by entering -9999. Variation: the user indicates they are finished by entering any negative number .
4. The program calculates how many of the input values satisfy a certain criterion. E.G. The data is sales and the program is to determine a) how many sales were above 1000, b) what percent of the sales was above 1000. E.G. the data is litter size and the program is to determine what percentage of the input litters had one in the litter, what percentage had two, what percentage had three, ..., what percentage had six, what percentage had more than six. the user indicates they are finished by inputting a -1. E.G. the data is input integers and the program determines how many are divisible by 6.

5. Program reads in a chemical formula and determines how many of each element is in the compound.

C. Variable condition other than flag:

1. Keep adding up consecutive numbers starting with 1 until the sum is greater than 10,000. Print out how many numbers are in the first sum greater than 10,000 and what that sum is.
2. Determine how many times two divides into a number.
3. Determine how many digits are in an input integer.
4. Add up the numbers the user inputs until the sum is greater than 10,000 or there is no more input- whichever comes first.

D. Nested loops

1. Print out a multiplication table for the numbers 1 through 10
2. Print out a box of stars with n stars horizontally and k stars vertically where n and k are input by the user.
3. Print out a right triangle of stars with its right angle in the lower left hand corner and its base and height k . (Variation: Do this with its right angle elsewhere)
4. Let the user repeatedly do any one of the above. E.G. program computes powers of numbers until the user inputs a negative power.
5. The program computes the sum of the first k powers of $1/2$, where k is input by the user. E.G. the user input 4 and the program calculates $1/2 + 1/4 + 1/8 + 1/16$ and prints it out.

What is output by the following code?

a)

```
for (i = 2; i <= 10; i += 2)
```

```
printf("%d", i);
```

b)

```
for (i = 2; i <= 35; i*=2) {  
printf("xx\n");  
printf("%d \n", i-1);  
}
```

c) What is output by the following code given the input

```
printf("input your number, -1 to quit\n");  
scanf ("%d", &x);  
while (x != -1) {  
if (x%4 == 2)  
printf ("%d ", x+1);  
if (x%4 == 0)  
printf("divisible by four");  
printf("zz\n");  
printf("input your number, -1 to quit\n");  
scanf ("%d", &x);  
}
```

input: 3 12 5 14 2 -1

d) What is output by the following?

```
int x=1,i;  
while(x <=5){  
for (i = 2; i <=7; i++) {  
if (i % 2 == 0)  
printf("%d", x);  
else  
printf("yy");  
}  
x++;  
printf("\n");  
}
```