

Write your solutions to the following using pencil and paper. Test your results on a computer to make sure they work and write the output you get with pencil and paper.

1. The integer $\log_3(x)$ of a positive number, x , is the number of times it can be divided by 3 until the result is less than 3. That is, $\log_3(x)$ is the largest power of 3 that is $\leq x$. For example, $\log_3(4) = 1$, $\log_3(9) = 2$, and $\log_3(30) = 3$. Write a program that inputs a number and then uses a **while** loop to find and print its logarithm to base 3.

2. Rewrite the following **while** loop as a **for** loop:

```
int i = 10;
while(i > -20)
{   cout << 1.0/(i*i) << endl;
    i -= 5;
}
```

3. Rewrite the following **for** loop as a **while** loop:

```
for(float j=2.718281828; j < 27.8; j *= 1.1)
    sum += log(j*j);
```

4. The sum of the first n positive integers ($1 + 2 + 3 + \dots + n$) is given by the formula:

$$\sum_{i=1}^n i = \frac{n(n-1)}{2}$$

Write a program that finds the sum of the first n positive even integers ($2 + 4 + \dots + 2n$) and use a modification of the formula above to test that your result is good.