1. Which loop statements does C++ support? Provide simple rules as to when to use each one.

2. How often do the following loops execute? Assume that the control variable \( i \) is not changed in the body of the loop.

i) \( \text{for ( int } i = 1; i <= 10; i++ ) \ldots \)

ii) \( \text{for ( int } i = 0; i < 10; i++ ) \ldots \)

iii) \( \text{for ( int } i = 10; i >0; i-- ) \ldots \)

iv) \( \text{for ( int } i = -10; i <= 10; i++ ) \ldots \)

v) \( \text{for ( int } i = 10; i >= 0; i++ ) \ldots \)

vi) \( \text{for ( int } i = -10; i <= 10; i=i+2) \ldots \)

vii) \( \text{for ( int } i = -10; i <=10; i+=3 ) \ldots \)
3. Rewrite the following for loop as a while and do .. while loop.

```cpp
int s = 0;
for (int i=1; i <= 10; i++)
    s+=1;
```

4. Rewrite the following do..while() loop into a while() loop.

```cpp
int n;
cin >> n;
double x = 0;
double s;

do {
    s = 1.0 / ( 1 + n*n );
x+=s;
n++;
} while (s > .01);
```
5. What are the values of $s$ and $n$ after each of the following loops completes execution?

a) \begin{verbatim}
int s=1;
int n = 1;
while ( s < 10 )
  s+=n;
n++;\end{verbatim}

b) \begin{verbatim}
int s=1;
for ( n = 1; n < 5; n++ )
  s+=n;\end{verbatim}

c) \begin{verbatim}
int s=1;
int n = 1;
do {
  s+=n;
n++;
} while ( s < (10 * n) );\end{verbatim}
6) What output do the following loops produce?

i) int s = 1;
   for (int n = 1; n <= 5; n++ ) {
       s += n;
       cout << s;
   }

ii) int s = 1;
    for (int n = 1; n <= 5; n+=2, cout << s ) {
       s+=n;
    }

iii) int s = 1;
     for (n = 1; n <= 5; n++ ) {
       s += n;
       n++;
     }
     cout << s << " " << n;
7) What output does the following program produce?

```cpp
#include <iostream>
using namespace std;

int main() {
    int y;
    int x = 1;
    int total = 0;

    while (x <= 10) {
        y = x*x;
        cout << y << endl;
        total += y;
        x++;
    }

    cout << "Total is " << total << endl;
}
```