Informatik I - Exercise Session
Expressions and Loops

1. Which of the following character sequences are not C++ expressions, and why not? Here, x and y are variables of type `int`.

   a) `(y++ && y) + 2.0`
   b) `y = (x++ = 3)`
   c) `3.0 + 3 - 4 + 5`
   d) `5 % 4 * 3.0 + true * x++`

2. For all of the valid expressions that you have identified in 1, decide whether these are lvalues or rvalues, and explain your decisions.

3. Determine the values of the expressions and explain how these values are obtained. Assume that initially `x == 1` and `y == -1`.

Can a user of the program observe the difference between the output produced by
these three loops? If yes, how?

```cpp
// loop 1
for (unsigned int i = 1; i <= n; ++i) {
    std::cout << i << "\n";
}
```

```cpp
// loop 2
unsigned int i = 0;
while (i < n) {
    std::cout << ++i << "\n";
}
```

```cpp
// loop 3
unsigned int i = 1;
do {
    std::cout << i++ << "\n";
} while (i <= n);
```

Convert the following `for`-loop into an equivalent `while`-loop:

```
1  for (int i = 0; i < n; ++i)
2      BODY
```

Convert the following `while`-loop into an equivalent `for`-loop:

```
1  while (condition)
2      BODY
```

Convert the following `do`-loop into an equivalent `for`-loop:

```
1  do
2      BODY
3  while (condition);
```