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ICS 313
Quiz #5
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Quiz #5:

Discuss the various methods by which loops can be implemented.

Answer:

1.   For loop: a programming language statement which allows code to be repeatedly executed. A for loop is classified as an iteration statement [1].

Unlike many other kinds of loops, such as the while loop, the for loop is often distinguished by an explicit loop counter or loop variable. This allows the body of the for loop (the code that is being repeatedly executed) to know about the sequencing of each iteration. For loops are also typically used when the number of iterations is known before entering the loop [1]. For example,

```
for (int counter = 0; counter < 10; counter++)
        // loop body
```

2.   While loop: is a control flow statement that allows code to be executed repeatedly based on a given boolean condition. The while loop can be thought of as a repeating if statement [2].

The while construct consists of a block of code and a condition. The condition is evaluated, and if the condition is true, the code within the block is executed. This repeats until the condition becomes false. Because while loops check the condition before the block is executed, the control structure is often also known as a pre-test loop. Compare with the do while loop, which tests the condition after

[1] http://en.wikipedia.org/wiki/For_loop
[2] http://en.wikipedia.org/wiki/While_loop
[3] http://en.wikipedia.org/wiki/Do_while_loop

the loop has executed [2]. For example,

```
x = 0;
while (x < 3) {
        printf("x = %d\n",x);
        x++;
}
```

3.   Do while loop: sometimes just called a do loop, is a control flow statement that allows code to be executed repeatedly based on a given Boolean condition [3].

The do while construct consists of a block of code and a condition. First, the code within the block is executed, and then the condition is evaluated. If the condition is true the code within the block is executed again. This repeats until the condition becomes false. Because do while loops check the condition after the block is executed, the control structure is often also known as a post-test loop. Contrast with the while loop, which tests the condition before the code within the block is executed [3].   For example, the following piece of code prints out a number's digits in a reversed order.

```
int value, r_digit;
do {
        r_digit = value % 10;
        printf("%d", r_digit);
        value = value / 10;
} while (value != 0);
```

4.   Loop can also be implemented using unconditional branching, such as goto or jump statements. For example:

```
#include <iostream.h>
void main () {
        int n=10;
        loop:
        printf("Count down: %d\n", n);
        n--;
        if (n>0)
        goto loop;
}
```

[1] http://en.wikipedia.org/wiki/For_loop
[2] http://en.wikipedia.org/wiki/While_loop
[3] http://en.wikipedia.org/wiki/Do_while_loop