

Programming Design, Spring 2013

Suggested Solution for Homework 03

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Problem 1

For this program, always **a is one!** will be printed out. The selection condition **a = 1** returns value 1, which will be interpreted as true by the **if** statement. Therefore, it is always the case that **a is one!** will be printed out.

Problem 2

- (a) The program allows the user to input one integer. If the integer is nonpositive or 1, it prints it out. If the integer is greater than 1, it starts a loop to process it: If it is an even number, it will be divided by two. If it is an odd number, it will be multiplied by 3 and then added by 1. In either case, the loop repeats as long as the resulting number is still greater than 1.
- (b) If the input number is no greater than 1, the final output will be whatever number the user inputs. If, however, the input number is greater than one, the program will keep looping until the resulting number becomes 1. In this case, the output will always be 1. In conclusion:
- If the input number is no greater than 1: The final output is whatever the user inputs.
 - If the input number is greater than 1: The final output can only be 1.

Note that for a greater-than-one input, no one says that the loop must terminate. It is just that if the loop terminates, the output must be 1.

- (c) One way of using a **for** loop to implement this program is as follows:

```
int i = 0;
cin >> i;

for (; i > 1; )
{
    if(i % 2 == 0)
        i = i / 2;
    else
        i = 3 * i + 1;
    cout << i << " ";
}
cout << "the final result: " << i;
```

Please note that this is not the only way. However, as there is no explicit loop counter for this loop, using a **while** loop is more natural.

Problem 3

The example program can be found at the "PDSp13_hw03_sol.cpp".