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Chapter 3

Pages 114 - 118

R3.1-3.5, 7, 13, 14, 19, 20, 27, 30

# Chapter 3 Written Homework

R3.1 Find the errors in the following if statements.

a. if x > 0 then cout << x; Parenthesis, did not use “else”
b. if (x > 0) ; { y = 1; } else ; { y = -1; } ; after both if and else
c. if (1 + x > pow(x, sqrt(2)) { y = y + x; } missing a )
d. if (x = 1) { y++; } need to use ==
e. cin >> x; if (cin.fail()) { y = y + x; } == true, or == false

R3.2 What do these code fragments print?

a. int n = 1; int m = -1;
   if (n < -m) { cout << n; } else { cout << m; }
   -1
b. int n = 1; int m = -1;
   if (-n >= m) { cout << n; } else { cout << m; }
   1
c. double x = 0; double y = 1;
   if (fabs(x - y) < 1) { cout << x; } else { cout << y; }
   1
d. double x = sqrt(2); double y = 2;
   if (x * x == y) { cout << x; } else { cout << y; }
   sqrt(2)

R3.3 Suppose x and y are variables of type double. Write a code fragment that sets y to x if x is positive and to 0 otherwise.

if (x > 0) y = x;

else y = 0;

R3.4 Suppose x and y are variables of type double. Write a code fragment that sets y to the absolute value of x without calling the fabs function. Use an if statement.

if (x >= 0) y = x;

else y = (-1*x);

R3.5 Explain why it is more difficult to compare floating-point numbers than integers. Write C++ code to test whether an integer n equals 10 and whether a floating-point number x equals 10.

Floating point numbers are harder to compare because they also hold decimal spaces, and when comparing, they might get truncated.

R3.7 The following pseudocode describes an algorithm that determines whether a square with a given letter and number is dark (black) or light (white).

```
If the letter is an a, c, e, or g
        If the number is odd
                color = "black"
        Else
                color = "white"
Else
        If the number is even
                color = "black"
        Else
                color = "white"
```

Using the procedure in Programming Tip 3.6 on page 97, trace this pseudocode with

input g5.

Letter is g, number is odd, thus black.

R3.13 Develop a set of test cases for the algorithm in Exercise R3.9.

- start1 = 1, end 1 = 2, start2 = 3, end2 = 4
- start1 = 3, end 1 = 2, start2 = 3, end2 = 4
- start1 = 18, end 1 = 15, start2 = 12, end2 = 23

R3.14 Develop a set of test cases for the algorithm in Exercise P3.13.

- month = 1, day = 4
- month = 10, day = 31
- month = 12, day = 21

R3.19 Explain the difference between a sequence of else if clauses and nested if statements. Give an example for each.

The else if clause is checked if it does not satisfy the if statement.

Nested if statements:

```
int x = 10;
if (x >= 10)
{
  cout << "x is greater than 10\n";
}
if (x > 0)
{
  cout << "x is positive\n";
}
```

Both statements print.

Sequence of else if clauses:

```
int x = 10;
```

```
if (x >= 10)
{
  cout << "x is greater than 10\n";
}
else if (x > 0)
{
  cout << "x is positive\n";
}
```

Only the first statement is printed.

R3.20 Give an example of a sequence of else if clauses where the order of the tests does not matter. Give an example where the order of the tests matters.

The example above. They print out different outputs.

R3.27 Suppose the value of b is false and the value of x is 0. What is the value of each of the following expressions?

a. b && x == 0 **true**
b. b || x == 0 **true**
c. !b && x == 0 **true**
d. !b || x == 0 **false**
e. b && x != 0 **false**
f. b || x != 0 **false**
g. !b && x != 0 **false**
h. !b || x != 0 **true**

R3.30 What is wrong with the following program?

```
cout << "Enter the number of quarters: ";
cin >> quarters;
total = total + quarters * 0.25;
cout << "Total: " << total << endl;
if (cin.fail()) { cout << "Input error."; }
```

quarters and total has not been declared/initialized yet. The cin.fail() should be implemented earlier, and subsequently, the program is not stopped if cin.fail() is true.