

CS 31 Worksheet 2

This worksheet is entirely **optional**, and meant for extra practice. Some problems will be more challenging than others and are designed to have you apply your knowledge beyond the examples presented in lecture, discussion or projects. All exams will be done on paper, so it is in your best interest to practice these problems by hand and not rely on a compiler.

Concepts

Logical Expressions, If Statements, Loops, Switch Statements

Reading Problems

1. If $x = -2$, $y = 5$, $z = 0$, and $t = -4$, what is the value of each of the following logical expressions?

a) $x + y < z + 1$

b) $x - 2 * y + y < z * 2 / 3$

c) $3 * y / 4 < 8 \ \&\& \ y \geq 4$

d) $t > 5 \ || \ z < 2$

e) $x * y < 10 \ || \ y * z < 10$

2. Write syntactically correct logical expressions for the following conditions:

1. m is less than 100
2. n is positive and greater than m
3. m is between 5 and 10 (inclusive)

4. k is less than 1 or greater than 2
5. j and k are both negative
6. i is an even number

3. What is the output of each of the following statements? Assume that

x = 5, y = 2, z = 10, and temp = 0

```
a) if (y >= x)
    y = z;
    cout << x << " " << y << " " << z << endl;

b) if (y >= x)
    {
        y = z;
        cout << x << " " << y << " " << z << endl;
    }

c) if (z < y)
    temp = x;
    x = z;
    z = temp;
    cout << x << " " << y << " " << z << endl;

d) if (z > y)
    {
        temp = x;
        x = z;
        z = temp;
    }
    cout << x << " " << y << " " << z << endl;

e) if (x >= 6)
    cout << x + y << endl;
    cout << x + y << endl;
```

4. What is the output of the following code?

```
int a = 10;
int b = 22;
while (a / 2 >= 1) {
    a--;
    cout << a << endl;
    if ((a + b) % 2 == 0) {
        a--;
        cout << a << endl;
    }
}
```

```

        b /= 2;
    }
}

```

5. This code snippet tries to print all prime numbers between 3 and a given input n . It has a number of bugs. Fix them and replace the inner while loop with a for loop.

```

int n, x;
cin >> n;
int candidate = 3;
while (candidate < n) {
    bool isPrime = true;
    x = 2;
    while (x < n) { // replace with a for loop...
        if (candidate % x == 0) {
            isPrime = false;
        }
        x = x + 1;
    }

    if (isPrime) {
        cout << n << " ";
    }
    candidate = candidate + 1;
}

```

Programming Problems

1) Write a program that takes in an integer N where $N > 0$, and outputs a comma-separated list of all the factors of N .

Sample input:

12

Sample output:

1,2,3,4,6,12

2. Write a program that reads in exactly four numbers and outputs the sum of the even numbers that have been entered. Write the solution once without any loops at all. Then write the solution again using a for loop. Write the solution again using a while loop. Write the solution again using a do-while loop.

Sample output:

Enter a number: 2

Enter a number: 9
Enter a number: -3
Enter a number: 6
Result: 8

3) Write a program that reads two integers and determines whether or not these two integers are palindromes of one another. A palindrome number is a value that reads the same forwards and backwards. HINT: Use % and / to break the value into its different digits.

Sample input:
62 26
Sample output:
true

Sample input:
154 451
Sample output:
true

Sample input:
25 56
Sample output:
false