Practice Test 1 C/C++

Question 1. (10 points) Suppose we have the following declarations:

```c
int m, n, i = 3, j = 4, k = 5;
double v, w, x = 1.1, y = 5.0;
```

Determine the value assigned to the variable in each of the following assignment statements or explain why it is not a valid assignment.

a) \( m = 1 + 2 \times 3 - 4; \) 3

b) \( n = 5 + k / 2 + j; \) 11

c) \( v = 5 + k / 2 + j; \) 11.0

d) \( w = x + 5 / 2 + y; \) 8.1

e) \( m = 5 \times x - (k \% 2); \) 4

f) \( n = 2(k + j); \) error - missing * between the 2 and (  

Question 2. (5 points) Write a C statement to calculate the following formula, where \( x, y, z \) are variables of type double. (Hint: Use math.h sqrt() function to calculate the square root, e.g., sqrt(9.0) returns 3.0)

\[
x = \sqrt{\frac{5y+1}{2+z^2}} + y = \text{sqrt}(\frac{5*y+1}{2+z*z}) + y;
\]

Question 3. (10 points) Evaluate the following boolean expressions. For each of the following expressions, assume \( x = 10, y = 20, \) and \( z = 30. \) Indicate which of the following boolean expressions are always true and which are always false, regardless of the values for \( x, y, \) or \( z. \)

a) \( x > 20 \&\& 5 > x \parallel y + 20 > z \) true, since \( y + 20 > z \)

b) \( y \% 30 >= y \&\& 40 / y + x >= z \) false, since \( 40 / y + x \) is not \( >= z \)

c) \( (x > y) == (x < y) \) false, but not always false since \( x \) could equal \( y \)

d) \( y <= 20 \&\& x == (x = z) \) true, \( y <= 20 \) and \( x \) will be equal to itself after \( x \) is assigned the value of \( z \)
Question 4. (15 points) Based on the value of the “temperature” variable, write “if” statements that print the appropriate messages using the printf statement.

<table>
<thead>
<tr>
<th>Temperature Range</th>
<th>Message to Print</th>
</tr>
</thead>
<tbody>
<tr>
<td>temperature ≤ 32</td>
<td>“Cold - below freezing!”</td>
</tr>
<tr>
<td>32 &lt; temperature &lt; 65</td>
<td>“Cool - wear a light jacket”</td>
</tr>
<tr>
<td>65 ≤ temperature &lt; 83</td>
<td>“Nice temperature!”</td>
</tr>
<tr>
<td>83 ≤ temperature</td>
<td>“Hot - wear shorts!”</td>
</tr>
</tbody>
</table>

if (temperature <= 32) {
    printf("Cold - below freezing\n");
} else if (temperature < 65) {
    printf("Cool - wear a light jacket\n");
} else if (temperature < 83) {
    printf("Nice temperature\n");
} else {
    printf("Hot - wear shorts!\n");
} /* end if */

Question 5. (10 points) Show the exact output generated by the below code including blanks and newlines.

```c
int age = 20;
int shoeSize = 11;

printf("Age = ");
printf( "\%d", age );
printf( "Shoe size = \n" );
printf( "\%d\n", shoeSize );
printf( "\n" );
printf( "Sum = \%d, age + shoeSize); printf( "\%d = Sum\n", age + shoeSize );
printf( "Sum = \%d\n", (age + shoeSize) );
```

<table>
<thead>
<tr>
<th>Output:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age = 20</td>
</tr>
<tr>
<td>Shoe size = 11</td>
</tr>
<tr>
<td>Sum = 31</td>
</tr>
<tr>
<td>Sum = 31</td>
</tr>
</tbody>
</table>

Name: ____________________
Question 6. (25 points) Below is the beginning of a program that should read three integer values from the user and print out and labels the value of the highest, middle, lowest number that the user enters. Finish the C program using “if” statements and calls to the printf and scanf function. You may assume that the three integer values entered are different. For example, if the user enters 20, 40, and 37, then the resulting “output” should look something like:

```c
#include <stdio.h>

int main() {
    int a, b, c;    /* variables to storage the three integers */

    printf("Enter three integers separated by spaces: ");
    scanf("%d %d %d", &a, &b, &c);

    if (a < b) {
        if (b < c) {
            printf("The largest number is %d.\n", c);
            printf("The middle number is %d.\n", b);
            printf("The lowest number is %d.\n", a);
        }
        else if (a < c) {
            printf("The largest number is %d.\n", b);
            printf("The middle number is %d.\n", c);
            printf("The lowest number is %d.\n", a);
        }
        else {
            printf("The largest number is %d.\n", c);
            printf("The middle number is %d.\n", a);
            printf("The lowest number is %d.\n", b);
        }
    }
    else {
        if (b < c) {
            if (a < c) {
                printf("The largest number is %d.\n", c);
                printf("The middle number is %d.\n", a);
                printf("The lowest number is %d.\n", b);
            }
            else {
                printf("The largest number is %d.\n", a);
                printf("The middle number is %d.\n", c);
                printf("The lowest number is %d.\n", b);
            }
        }
        else {
            printf("The largest number is %d.\n", a);

            printf("The middle number is %d.\n", b);
            printf("The lowest number is %d.\n", c);
        }
    }

    return 0;    /* 0 indicates program ended successfully */
}    /* end main */
```
Question 7. (25 points) Write a program that uses a sentinel-controlled loop to determine the high and low test scores. Your program should provide good prompts to the user and produce correct and well labelled results.

/* Program to find high and low test scores. */
#include <stdio.h>

int main ( ) {
    int low, high, score;

    printf("Enter a score (or -999 to quit): ");
    scanf("%d", &score);

    low = score;
    high = score;

    while (score != -999) {
        if (score < low) {
            low = score;
        } else if (score > high) {
            high = score;
        } // end if

        printf("Enter a score (or -999 to quit): ");
        scanf("%d", &score);
    } // end while

    if (low == -999) {
        printf("No scores were entered!\n");
    } else {
        printf("The low score is %d.\n", low);
        printf("The high score is %d.\n", high);
    } // end if

    return 0; /* 0 indicates program ended successfully */
} /* end main */