TRUMAN STATE UNIVERSITY

Final Exam

Student Name: _____

Student Identification Number: _____

[5 points] Questions 1: Write a C++ program that will input a floating point number as Celsius and then convert that Celsius number to a Fahrenheit value. Display the computed value. You can use the equation: `F = 9/5 * C + 32` for the conversion.

[5 points] Question 2: In the main function, declare and initialize an array of integers. Now, print all of the elements of the array in reverse order. You can assume that the size of the array is stored in a constant variable named, SIZE. For example, if the array elements are, {10, 20, 60, 5, 100} then the program should display 100 5 60 20 10.

[5 points] Questions 3: Write a function called, calc_circle_area that takes diameter (double) and area (double) as parameters. The parameter diameter is passed by value, and the parameter area is passed by reference. The function calculates the area of the circle and assigns the calculated value to the area variable. The function does not return a value. The formula to calculate the area of the circle is:

Area =PI * r * r ; // where, r is the radius of the circle, and PI = 3.14159 (use PI as a constant value)

In addition, show in a main function, how the calc_circle_area function can be used to get the area of a circle with the diameter 5.0

[5 points] Questions 4: Determine the output of the following nested loop

```
for (unsigned pal= 5; pal<8; pal++)
{
   for (unsigned count=21; count<26; count++)
   {
      cout<< (count % pal) <<" ";
   }
   cout<<endl;
}
```

[5 points] Questions 5: Write an interactive loop by using the following algorithm. After each iteration of the loop the program asks the user whether there is more data to process. Here is the algorithm

```
initialize total to 0.0
initialize count to 0
set moredata to "yes"          // Here, more data is a string variable
while moredata is "yes"
        input an integer number and store the value in the variable, x
        add x to total
        add 1 to count
        prompt the user if she wants to continue and store the response in the variable, moredata

output total/count
```

[5 points] Questions 6: Input a floating point score value for a student and output the following. If the score is greater than equal to 90 then display “Amazing”; if the score is greater than equal to 80 but less than 90 then display “Blissful”; if the score is greater than equal to 70 but less than 80 then display “Charming”; if the score is greater than equal to 60 and less than 70 then display ‘Daunting”; if the score is greater than equal to 50 and less than 60 then display “Enigmatic”; Lastly, if the score is less than 50 then display “Forget it”.

[5 points] Questions 7: (a) Write down the output of the following program.

```
for(unsigned count = 10; count<20; count++)
{
      if(count == 15)
            continue;
      cout<<count<<" ";
}
```

(b) Write down the output of the following program

```
unsigned count = 10;
while(count<20)
{
      if(count == 15)
            break;
      cout<<count<<" ";
      count++;
}
```

[5 points] Questions 8: Write a function called findMultipleOfFives that takes a vector of integers as parameter (passed as constant reference) . Your function should return true if every number in the vector is a multiple of the number 5. The function should return false otherwise.

For example, for a given vector variable, `vector<int> all_values{10, 20, 30, 40, 50}`, the function `findMultipleOfFives` will return true. However, for a given vector variable, `vector<int> all_values{10, 24, 30, 40, 5}`, the function will return false.

[10 points] Questions 9: For any integer number, intValue (intValue is a positive integer number), write a C++ function named calcFactorial (intValue) that will calculate and return the factorial of the variable, intValue. For example, if intValue =5, then the factorial of intValue can be calculated as: factorial = 5 * 4 * 3 * 2 * 1

[10 points] Questions 10: (a) For the given struct, student_info, write C++ program code to declare two struct variables st_one and st_two. Initialize the values in those two variables and then determine whether the two objects are equal to each other.

```
struct student_info
{
    std::string name;
    unsigned id_number;
    unsigned score;
};
```

(b) Write down a function named, display_student_info that takes a student_info variable as a parameter (pass the parameter as const reference). The function should display all the fields of the student_info variable by using standard output function (cout).

[5 points] Question 12: Write code for a data validation loop that continues to read a value for the variable windspeed until the value is in the range MAX_SPEED to MIN_SPEED (inclusive).

```
// use a do-while loop to complete the program
const unsigned MIN_SPEED = 65;
const unsigned int MAX_SPEED = 300;
unsigned windspeed;
```

[5 points] Question 13: Write the definition of a function that finds and returns the index position of the minimum element in an unsorted vector of int values. You can assume that the vector variable has at least one element.

```
size_t find_minimum(vector<int> vector_values)
```

[10 points] Question 14: Write a C++ program that does the following:

1. Prompt the user and input a variable named **array_size**.

2. Dynamically allocate an array, named array_values (use a pointer variable) exactly large enough to hold **array_size** number of integer values.
3. By using a loop initialize the array with integer values ranging from 1 to **array_size**. First array element will be assigned the value 1, second element will be assigned the value 2, ..., the last element will be assigned the value **array_size.**
4. By using a loop find the average of the values of the array and print the average value.
5. Before the program ends, make sure to delete the array_values from the memory.

[5 points] Question 16: Write a C++ function that will use the line characters and store them in reverse order in the reverse_string variable (do not use any built-in functions). For example, if line = "abc" then in the reverse_string we should have "cba"

// SIZE is the length of the arrays

```
void string_reverse(const char line[], char reverse_string[], const int SIZE)
```