CSCI 2380 Practice Midterm

- Do not start until instructed to do so.
- Write your UTRGV ID only in the space provided at the top of this page.
- The midterm is closed - no books, notes, computers, cell phones, calculators, etc.
- The time allotted for the exam is 70 minutes.
- There are 7 questions worth 28 points total; each problem is worth 4 points.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Score</th>
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<tbody>
<tr>
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Problem 1. What does the following program print? Draw a box around your solution.

```cpp
#include <iostream>
using namespace std;

int main()
{
    int a = 4;
    int* b = &a;
    ++a;
    cout << a << " " << *b << endl;
    *b = *b + 1;
    cout << a << " " << *b << endl;

    int* A[2] = {&a, b};
    int** B = A;
    cout << *(A[0]) << " " << *(B[0]) << endl;
    *(B[0]) = *(B[0]) + 1;
    cout << *(A[0]) << " " << *(B[0]) << endl;
}
```

Problem 2. Fill in the blanks according to the syntax of C++:

Class declarations should be put in ________________ files, not source files.

Local variables are allocated in a computer’s memory on the ________________.

Explicitly deallocating memory is done using the ________________ keyword.

The ________________ operator gives the memory address of a variable.
Problem 3. Assume that the Queue and Stack classes in the following code behave as typical queues and stacks of ints. What does the following program print? Draw a box around your solution.

```cpp
#include <iostream>
#include "queue.h"
#include "stack.h"

using namespace std;

int main()
{
    Queue q;
    Stack s;
    for (int i = 1; i <= 4; ++i)
        s.push(i);
    while (s.size() > 0)
    {
        q.push(s.top() + s.size());
        s.pop();
    }
    while (q.size() > 0)
    {
        s.push(q.front() + q.size());
        q.pop();
    }
    while (s.size() > 0)
    {
        cout << s.top() << endl;
        s.pop();
    }
}
```

Problem 4. Determine the truth of the following statements about C++.

Every variable is an object. □ True □ False

A function cannot modify a variable declared outside the function. □ True □ False

Every class has a constructor. □ True □ False

Every method can be called from outside the class. □ True □ False
Problem 5. Write a function named `save_array` that takes a `float` pointer parameter named `A`, an `int` parameter named `len`, and a `string` parameter named `filename`. The function should write the `float` elements of the array `A` to the file with name `filename`, one per line. Assume `A` has length `len`.

Problem 6. Declare a class named `Airplane` with the following methods and instance variables:

- A (public) constructor with an `int` parameter and a `string` parameter.
- A public method named `info` with no parameters that returns a `string`.
- A private `int` variable named `capacity`.
- A private `string` variable named `model`.
Problem 7. Complete the following implementation of the push method of a stack implemented using a dynamic array. As in lecture, the bottom of the stack is at the front of the array.

```cpp
void Stack :: push(float x)
{
    if (count _____ capacity)
    {
        float* new_A = _______ float[ 2 * _______ ];
        for (int i = 0; i < count; ++i)
            _______ = A[i];
        delete[] _______ ;
        A = new_A;
        capacity *= _______ ;
    }
    A[ _______ ] = x;
    ++ _______ ;
}
```