COEN 79

Object-Oriented Programming and Advanced Data Structures

Assignment #1 - Due: April 8ᵗʰ, 2022 – 11:59PM

Name: Date:

- Number of questions: 10
- Points per question: 0.2
- Total: 2 points

1. Please answer the following questions:
   - What is *procedural abstraction*?

   - Mention an approach for detecting invalid function input data at an early point.

2. What is the time complexity of this algorithm? Please prove your answer.

```
while ( low <= high )
{
  mid = ( low + high ) / 2;
  if ( target < list[mid] )
     high = mid – 1;
  else if ( target > list[mid] )
     low = mid + 1;
  else break;
}
```

3. What is the time complexity of `fun()`. Please prove your answer.

    ```
    int fun(int n)
    {
      int count = 0;
      for (int i = n; i > 0; i /= 2)
        for (int j = 0; j < i; j++)
            count += 1;
      return count;
    }
    ```

4. Give a concise formula that outputs *the approximate number of digits in a positive integer*. The integer is written in base 10.

5. You are at a computer science cocktail party, and you meet a student who has just started working with a debugger. With about three or four sentences, explain the basic features of your debugger and how they help you find bugs.

6. What are the _four_ properties of a *constructor*?

7. What is the difference between a *class* and an *object*? Include an example in your answer.

8. What are the two methods for finding test data that is most likely to cause errors.

9. What are the _three_ ways we can use items defined in a _namespace_? Include examples in your answer.

10. Discuss the output of the following codes:

■ Code 1

```
1.  class Test {
2.      int x;
3.  };
4.
5.  int main() {
6.      Test t;
7.      t.x = 20;
8.      getchar();
9.      return 0;
10. }
```

■ Code 2

```cpp
1.  struct Test {
2.      int x;
3.  };
4.
5.  int main() {
6.      Test t;
7.      t.x = 20;
8.      return 0;
9.  }
```