**Candidate’s Name:**

**Date of Completion:**

Solve the following problems programmatically. These exercises can be done in any object-oriented language although we would prefer they be done using C# in Microsoft Visual Studio. Please type all answers (no hand written submissions).

\*NOTE\* although it is not required, we encourage candidates to send other source code examples from side projects, etc. in addition to these answers.

**Core OOP Knowledge**

1. Construct a base class that represents a generic animal. This class should contain at least two properties and two methods
2. Demonstrate the following in a main application method:

* Declare and initialize the class
* Reassign at least two class variables using class properties
* Make two class method calls

1. Construct a second class that inherits from the previous animal class. This class should contain at least one overridden method or property as well as one property and one method that are not in the parent class. Feel free to modify the parent class if necessary.

**Programmatic Problem Solving**

1. 2520 is the smallest number that can be divided by each of the numbers from 1 to 10 without any remainder. What is the smallest positive number that is evenly divisible by all of the numbers from 1 to 12?
2. If we list all the natural numbers below 10 that are multiples of 3 or 5, we get 3, 5, 6 and 9. The sum of these multiples is 23. Find the sum of all the multiples of 3 or 5 below 1000.

**SQL**

Demonstrate your SQL knowledge by solving the following problems.

Given the following tables:

Course

|  |
| --- |
| Course Number(PK) |
| Course Name |
| Professor ID |
| Term |
| Credits |

Professor

|  |
| --- |
| Professor ID(PK) |
| Professor Name |
| Department |

1. Construct a query that returns all courses with at least 3 credits and those that are only offered in the “fall” semester.
2. Construct a query that returns the professor name of all professors that teach “Intro to C#”.
3. Construct a relational table that would allow you to easily join these two tables together.
4. If the Course table contains millions of records, what could you do to increase the speed of queries that constantly filter on the “Term” and the “Credits” columns?