Class 01 - Computation and Algorithms
COMP 130 – Introduction to Computing
Dickinson College

Names: _____

A. The Hi-Lo Game

Hi-Lo is a number guessing game with the following rules:
   a. There are two players: A and B
   b. Player A thinks of a number from 1 to 100.
   c. Player B guesses a number.
   d. Player A responds with the appropriate response from the following options:
      1. Too high
      2. Too low
      3. You win
   e. Steps c-e are repeated until the response is "You win" or the players quit.

Play the game a few times to be sure everyone understands the rules. Then answer the following question.

Q1: There are many different strategies that player B can use to play Hi-Lo. Below name and describe 4 or 5 different strategies that player B could use. Note: It is not necessary that all strategies to be good ones, just that they eventually will win. So cover a range of strategies from very simple to clever.

   A1. Name: _____

   Description:

   A2. Name: _____

   Description:

   A3. Name: _____

   Description:

A4. Name: _____

      Description:

A5. Name: _____

      Description:

B. Algorithms

An *algorithm* is a set of steps that when followed produce a solution to a problem. These steps can be followed by a person (like the ones you wrote above), Or as we'll see this semester they can be expressed in a programming language that lets a computer follow them. Answer the following questions about the algorithms you expressed in part A.

Q2: Using the table below rank your algorithms (A1-A5) from easiest to hardest in terms of how difficult they would be to write so that another person who only receives the written description could follow them. Ties are permitted.

Difficulty:

Easy 1	2	3	4	Hard 5

Q3: Using the table below rank your algorithms (A1-A5) from fastest to slowest in terms of how many guesses will typically be required to win the game using that algorithm. Ties are permitted.

Speed:

Fast 1	2	3	4	Slow 5

Q4: Plot each of your algorithms on the graph below using your rankings from the previous two questions. When you have completed this graph add your points to the graph on the board at the front of the room using a different color pen.

Hard 5					
4					
3					
2					
Easy 1					
	1 Fast	2	3	4	5 Slow

Difficulty (vertical axis label)

Speed (horizontal axis label)

Q5: Discuss the graph in the previous question. Using a complete and articulate sentence express the tradeoff between the speed and difficulty rankings of your algorithms.

STOP

C. Algorithmic Tradeoffs:

Q6: Do you think that the tradeoff you identified would be true for algorithms for other problems? Would it be true for all problems? Explain your answers.

Q7: Given the tradeoff you identified above what considerations might affect which algorithm a software developer chooses to solve a particular problem?

Q8: In problems like the Hi-Lo game there is an exact right answer. However, in other problems for which algorithms are now frequently being used there is no exact right answer. For example, consider problems like:

- o the order in which Google presents your search results.
- o the news that Facebook decides to show you.
- o the books or products that Amazon recommends for you.
- o the videos that YouTube or Netflix recommend for you.

For problems like these, what other technical and non-technical considerations might affect the choice of algorithm? How should those considerations be balanced?