CS 162 Recitation 8 Worksheet

Class Relationship:
1. Given the following possible classes, list at least three “has-a” relationship, and three “is-a” relationship.

- Animal
- Dog
- Shape
- Mammal
- Triangle
- Teeth
- Vehicle
- Person
- Driver
- Wheel
- Truck
- Space Shuttle

Accessibility:
2. Explain the difference between public, private, and protected.

Inheritance:
Given the following code, discuss the following and write code to prove your answers.

```cpp
struct Card {
    int rank; // 1-13
    string suit; // “heart”, “spade”, “diamond”, “club”
};

class Cardgame {
    protected:
        Card *deck;
        int num_cards;
    public:
        Cardgame();
        ~Cardgame();
        void play_game();
};

class Gofish : public Cardgame { // inherited from Cardgame
    private:
        int max_players;
    public:
        Gofish();
        ~Gofish();
};
...
```
3. If we create a child object, i.e. Gofish g;
   a. What is inherited and not inherited?
   
   b. What is accessible and not accessible?
   
   c. In what order is the Cardgame constructor and Gofish constructor called?
   
   d. When the object g is out of scope, in what order is the Cardgame destructor and Gofish destructor called?

4. Using examples (Cardgame and Gofish class objects), explain upcasting and downcasting.

5. Now, assuming three other classes, Solitaire, Blackjack, and Rummy, are inherited from Cardgame.
   a. How would you handle this so that all objects (Gofish, Golitaire, Blackjact, or Rummy) can be stored into a single array?

   b. Which class can be abstract? What function(s) can be pure virtual, and why?

   c. If any of the child classes contain dynamic memory that relies on destructor to free. What else needs to be done to avoid memory leaks?

Open floor: Q&A for Assignment 4