I.T 1 An Example of Encapsulation (function from a Class)

```
1   package com.codeclan.solitare;
2
3   import ...
6
7   /**...*/
10
11  public class GameLogic {
12      private ArrayList<ArrayList<Card>> aceStacks;
13      private ArrayList<ArrayList<Card>> gameStacks;
14      private Deck deck;
15      private ArrayList<Card> pile;
16
17      public GameLogic(){...}
23
24
25      public Card getPileCard(){
26          if(getPile().size() >= 1) {
27              Card card = this.pile.get(pile.size() - 1);
28              return card;
29          }
30          return null;
31      }
```

I.T Screenshots for use of Inheritance

i. A Super Class

```
1  package music_management;
2  import behaviours.*;
3
4  public abstract class Instrument implements Playable, Sellable{
5
6    private InstrumentColour colour;
7    private InstrumentType type;
8    private int wholesalePrice;
9    private int retailPrice;
10
11   public Instrument(InstrumentColour colour, InstrumentType type,
12     int wholesalePrice, int retailPrice){
13
14       this.colour = colour;
15       this.type = type;
16       this.wholesalePrice = wholesalePrice;
17       this.retailPrice = retailPrice;
18   }
19
20   public int calculateMarkUp(){
21     return this.retailPrice - this.wholesalePrice;
22   }
23
24
25 }
```

ii. Child class (inherits from Instrument)

```java
package music_management;

public class FrenchHorn extends Instrument{

  public FrenchHorn(InstrumentType type,
    InstrumentColour colour, int wholesalePrice,
    int retailPrice ){
    super(colour, type, wholesalePrice, retailPrice);
  }

  public String play(){
    return "Broot";
  }
}
```

iii.An object of the child class

```java
import static org.junit.Assert.*;
import org.junit.*;
import behaviours.*;
import music_management.*;

public class FrenchHornTest{

  FrenchHorn horn;

  @Before
  public void before(){
    horn = new FrenchHorn(InstrumentType.WIND, InstrumentColour.GOLD, 300, 500);
  }

  @Test
  public void canGetMarkUp(){
    assertEquals(200, horn.calculateMarkUp());
  }
}
```

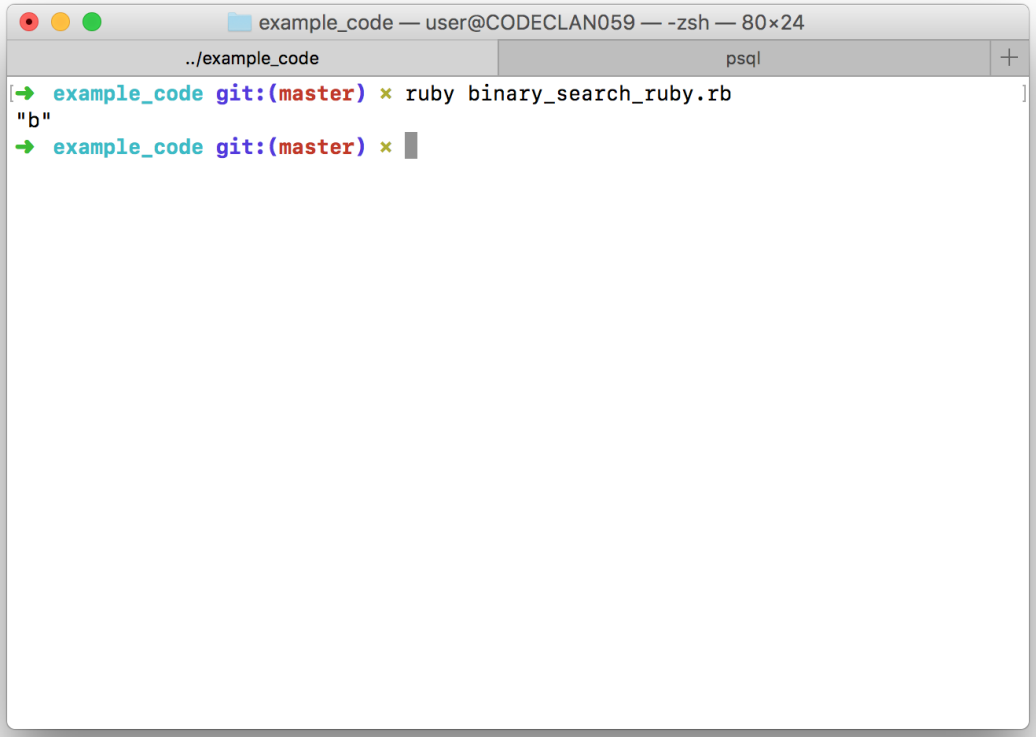
iv. A method that uses the information from the inherited class (ArrayList contains Instruments of Sellable types)

```java
package music_management;
import java.util.*;
import behaviours.*;

public class Shop{
  private ArrayList<Sellable> stock;

  public Shop(){
    this.stock = new ArrayList<Sellable>();
  }

  public int totalPotentialProfit(){
    int potentialProfit = 0;
    for(Sellable item: this.stock){
      potentialProfit += item.calculateMarkUp();
    }
    return potentialProfit;
  }
```

I.T 3 Search function

binary_search_ruby.rb

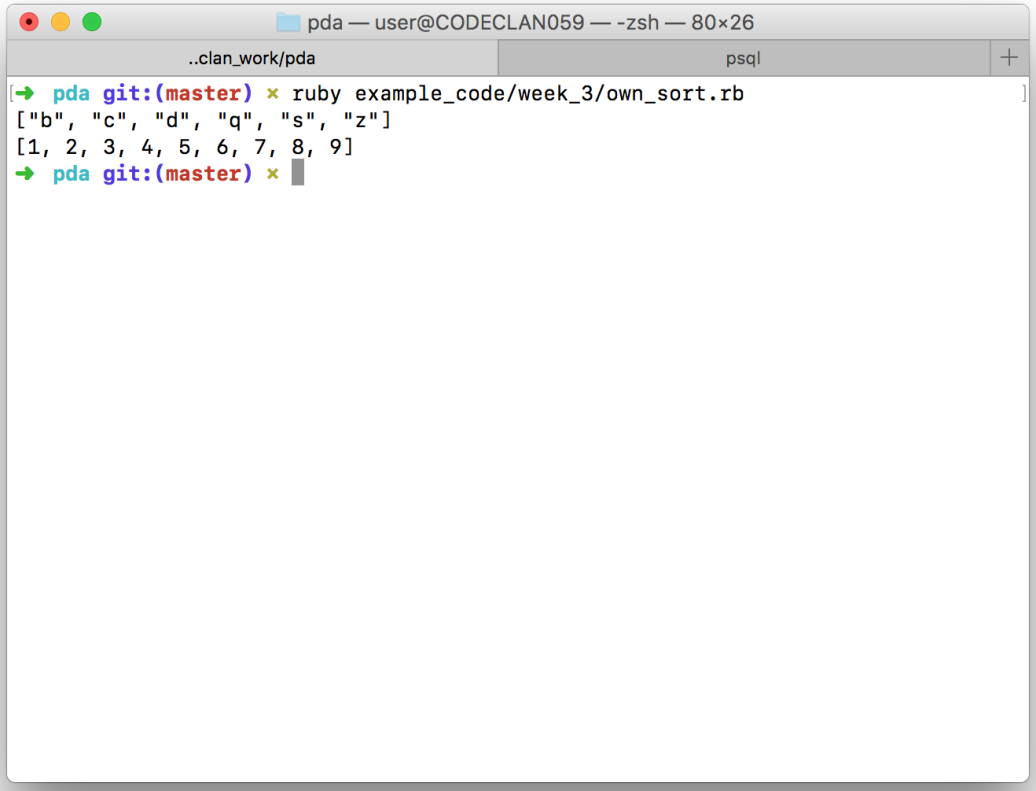
```ruby
class BinarySearch
  attr_reader :array
  def initialize()
    @array = ['a', 'b', 'c' , 'd', 'e']

  end

  def binary_search(item_to_find)
    high = (@array.size) - 1
    low = 0

    while (low <= high)
      mid = (high + low) / 2

      if @array[mid] == item_to_find
        return array[mid]
      elsif @array[mid] < item_to_find
        low = mid + 1
      else
        high = mid - 1
      end
    end
    return nil
  end
end


search = BinarySearch.new
p search.binary_search('b')
```



I.T 4 Sort Function

own_sort.rb

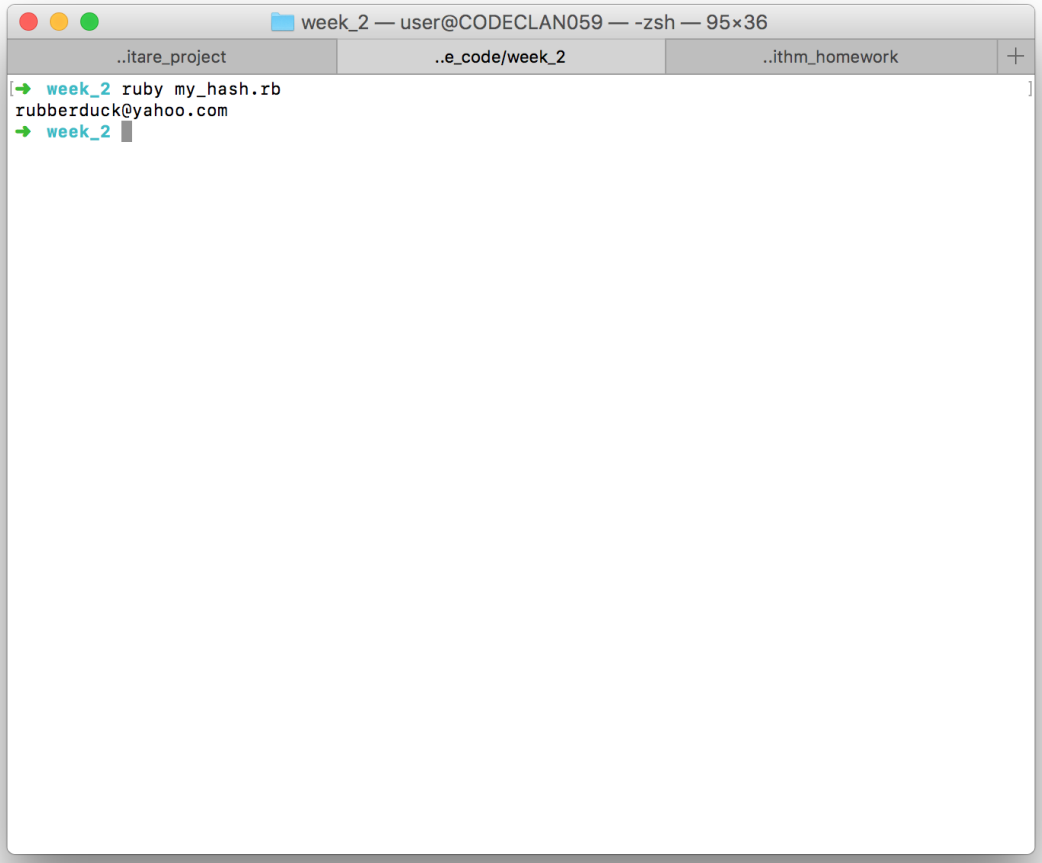
```ruby
require('pry')
class OwnSearch

  def self.sorting(array)
    return array.first if array.size <= 1
    sorted_arr = Array.new()
    #iterate through the given array and each iteration find the largest and smallest values
    while array.size > 0
      count = 0
      smallest = array[0]
      smallest_index = 0
      array.each do |item|
        smallest_index = count if item < smallest
        smallest = item if item < smallest
        count += 1
      end
      sorted_arr.push(array[smallest_index])
      array.delete_at(smallest_index)
    end
    return sorted_arr
  end
end

p OwnSearch.sorting(['q','c','z','b', 's', 'd'])
p OwnSearch.sorting([9,8,7,6,5,4,3,2,1])
```



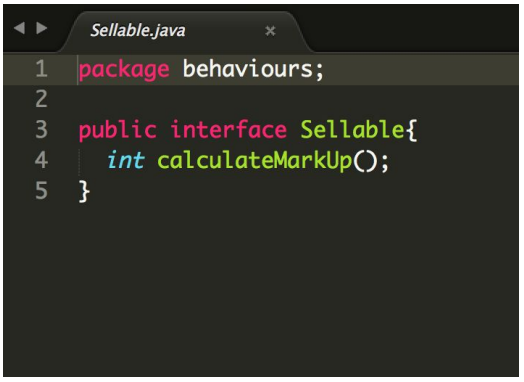
I.T 5 Use of an array in a program

I.T 6 Use of a hash in a program

```ruby
def people()
  hash_of_people = {
    "Chris" => "rubberduck@yahoo.com",
    "John" => "programs@gmail.com",
    "Stephen" => "rubberduck@hotmail.com",
  }
end

def get_email(name)
  return people()[name]
end

puts get_email("Chris")
```



I.T 7 Use of Polymorphism



An Item can is an Item or can be a Sellable.

```java
package music_management;
import behaviours.*;

public class Item implements Sellable{

  String item;
  int wholesalePrice;
  int retailPrice;

  public Item(String item, int wholesalePrice, int retailPrice){
    this.item = item;
    this.wholesalePrice = wholesalePrice;
    this.retailPrice = retailPrice;
  }

  public int calculateMarkUp(){
    return this.retailPrice - this.wholesalePrice;
  }

}
```

Instrument super class which implements Sellable.

```java
package music_management;
import behaviours.*;

public abstract class Instrument implements Playable, Sellable{

  private InstrumentColour colour;
  private InstrumentType type;
  private int wholesalePrice;
  private int retailPrice;

  public Instrument(InstrumentColour colour, InstrumentType type, int wholesalePrice, int
    retailPrice){

    this.colour = colour;
    this.type = type;
    this.wholesalePrice = wholesalePrice;
    this.retailPrice = retailPrice;
  }

  public int calculateMarkUp(){
    return this.retailPrice - this.wholesalePrice;
  }


}
```

A FrenchHorn is an Instrument but can be a Sellable.

Shop.java | ShopTest.java | FrenchHorn.java

```java
package music_management;

public class FrenchHorn extends Instrument{

  public FrenchHorn(InstrumentType type, InstrumentColour colour, int wholesalePrice, int
    retailPrice ){
    super(colour, type, wholesalePrice, retailPrice);
  }

  public String play(){
    return "Broot";
  }
}
```

Shop class which uses an ArrayList of Sellable types.

Shop.java

```java
package music_management;
import java.util.*;
import behaviours.*;

public class Shop{
  private ArrayList<Sellable> stock;

  public Shop(){
    this.stock = new ArrayList<Sellable>();
  }

  public int totalPotentialProfit(){
    int potentialProfit = 0;
    for(Sellable item: this.stock){
      potentialProfit += item.calculateMarkUp();
    }
    return potentialProfit;
  }

  public int countStock(){
    return stock.size();
  }

  public void addStock(Sellable item){
    stock.add(item);
  }
```

FrenchHorn and Item objects can be added to shop object stock as Sellable. Then test that totalPotentialProfit() adds all calculateMarkUp() functions for each Sellable in the ArrayList.

```
52
53    @Test
54    public void cancanGetTotalPotentialProfitFromItemsAndInstruments(){
55      FrenchHorn horn = new FrenchHorn(InstrumentType.WIND, InstrumentColour.GOLD, 300, 500);
56      FrenchHorn horn2 = new FrenchHorn(InstrumentType.WIND, InstrumentColour.SILVER, 300, 500);
57      Item item = new Item("Sheet Music", 10, 20);
58      shop.addStock(horn);
59      shop.addStock(horn2);
60      shop.addStock(item);
61      assertEquals(410, shop.totalPotentialProfit());
62      // horn markup = 200, horn2 markup = 200 and item markup = 10 total = 410
63
64    }
65  }
```

Tests run as expected.