A. The Country Class

Country
protected int cNumber,cPopulation protected String cName protected double cGNI, cPCI, cStandard protected int cPopulation
public Country() public void modifyMe(Country thisCountry) public void inputData(int x) public String printMe() public double getPCI() public String getCountry() public String setPCI() protected void finalize() throws java.lang.Throwable protected void destroyMe(Object thisObj)

A1. The Country() Constructor

```
START
    cNumber, cGNI, cPCI, cPopulation = 0;
    cName = “”;
STOP
```

A2. The modifyMe(Country thisCountry) Method

```
START
    cNumber = thisCountry.cNumber;
    cName = thisCountry.cName;
    cGNI = thisCountry.cGNI;
    cPCI = thisCountry.cPCI;
    cPopulation = thisCountry.cPopulation;
STOP
```

A3. The inputData(int x) Method

```
START;=
    Let countryHeading and cNumberString be strings;
    Prompt for countryHeading and cNumberString;
    cNumber = cNumberString;
    Prompt for cNumber, cName, cGNI, and cPopulation;
    cPCI = cGNI/cPopulation;
STOP
```

A4. The printMe() Method: Returns a string

```
START
    Let printString be a string
    printString = "Country Number: " + cNumber + "\n" + "Name: " + cName + "\n" +
```

"Gross National Income: " + cGNI + "\n" + "Population: " + cPopulation + "\n" + "Per Capita Income: " + cPCI + "\n" + "Standard Deviation: " + cStandard;
Return printString;
STOP

A5. The getCountry() Method: Returns an Integer
START
Return cNumber;
STOP

A6. the getPCI() method: returns a double
START
Return cPCI;
STOP

A7. The setPCI(double thisPCI) Method: returns a double
START
cPCI = this.PCI;
Return thisPCI;
STOP

A8. The finalize Method
START
destroyMe(this);
STOP

A9. The destroyMe(thisObj) Method
START
thisObj = null;
System.gc();
STOP

B. The CountriesMonitor Class

CountriesMonitor
public static CountriesLinkedList countriesList = new Country(); public static final String HEADING = "Countries Linked List of Petr Bowles"; public static final int DEFAULT_NUMBER = 0; static double totalPCI, averagePCI, stdDevPCI;
public static void main(String[] args) public static void inputCountries() public static void queryCountry(CountriesLinkedList thisList) public static void listCountries(CountriesLinkedList thisList) public static void sortCountries (CountriesLinkedList thisList) public static void standardDev (CountriesLinkedList ThisList, int thisLim, double thisAvg); public static void removeCountries () public static void checkSize(CountriesLinkedList thisList) public static void initialize() public static void empty()

```
Public static void summarizeCountries(CountriesLinkedList thisList);
Private static void highLow(Country thisCountry();
Public static void initializeSummary();
```

B0. The main(String[] argos) Method

START

Let exitTime be Boolean, initialized to FALSE;
Let option be an integer;
Let countryList be an Linked List of Country objects;
totalPCI = 0;

// Main Operations
While (Not exitTime) do the following:
Present the user with the following menu:
1. Enter Countries Info
2. Query for a Country
3. List unsorted countries
4. Remove a country
5. Check the size of the list
6. Empty the list
7. Prove the summary
8. Display the sorted list
9. Exit Prompt user to key in the a menu selection and store this in Option;

Case Option is:
1: countryList := inputCountries ( ); // Obtain information for countries
2: queryCountry(countriesList);
3: listCountries(countriesList);
4: removeCountries(countriesList);
5: checkSize(countriesList);
6. empty();
7. standardDev(countriesList, averagePCI);
8. sortCountries(countriesList);
9: Set exitTime to True;

End-Case;
End-While;

STOP

B1.The inputCountries() Method

START

Let x, numberOfCountries be integers;
Let currentCountry be a new country object;

Prompt for number of countries and store this in numberOfCountries;
Ensure capacity of countriesList by comparing to numberOfCountries;

```
        For (x := 1 to numberOfCountries with increments of 1) do the following
        Instantiate currentCountry = new Country()];
        currentCountry.inputData(x);
        countriesList.add(x-1, currentCountry);
        totalPCI += currentCountry.getPCI();

        End-For;

        averagePCI := totalPCI/numberOfCountries;
STOP
        B2. The queryCountry(CountriesLinkedList thisList) Method
START
        Let outString be a string;
        Let searchCountry and foundCountry be new Country Objects

        String qHeading = "Country Query";
        boolean exitTime = false;
        boolean exitNow;
        int thisLim = thisList.getSize();

        If thisLim > 0:
        While exitTime is true;
        Accept user input for searchNumber;
        Declare foundCountry as a new empty Country;
        exitNow = false;

        For(x := 1 to thisLim && exitNow is false,  incrementing by 1) do the following:
        If searchNumber match thisList.getInfo(x-1.getCountry());
        Set foundCountry equal to the value and exitTime to true;
        End if;

        Otherwise set outString to error message
        Prompt for nextUserAction
        If nextUserAction equals cancel option, then exitTime = true
        End while
        End if
STOP
        B3. The listCountries(CountriesLinkedList thisList) Method
START
        Let outString be a string = “Members of the list are:”
        for(x:= 1 to thisList.getSize() incrementing by 1) do the following:
        Add thisList.getInfo(x-1).printMe() to outString
        End for
```

Show output
STOP

B4. The sortCountries(CountriesLinkedList thisList) Method
START
Let outString be a string = “Members of the list are:”
Let sortedCountry be a new Country;
Let newList be and ArrayList equal to thisList;
Int limit = newList.getSize();

for(x:= 0 to limit - 1 incrementing by 1) do the following:

for(y:= 0 to limit - 1 incrementing by 1) do the following:
If newList position x PCI is greater than newList position y + 1 PCI do the following:
sortedCountry.modifyMe(newList.getInfo(y + 1));//x
newList.getInfo(y + 1).modifyMe(newList.getInfo(x));//x,y
newList.getInfo(x).modifyMe(sortedCountry);//x,sort

End if
End for
End for

for(z := 1 to limit incrementing by 1) do the following:
outString += newList.getInfo(z-1).printMe();
End for
Output outString;
STOP
B5. The standardDev(CountriesLinkedList thisList, int thisLim, double thisAvg) Method
START
double standard, diff, totalDiff,
int limit = thisList.getSize();
totalDiff = 0;

for(x := 1 to limit incrementing by 1) do the following:
diff = (thisList.getInfo(x-1).getPCI() - averagePCI)^2;
totalDiff += diff;
End for

standard = Math.sqrt(totalDiff/limit);
Return standard
STOP
B6. The removeCountries() Method
START
Let removalPrompt and removalHeading be strings;

```
        removalHeading = "Removal of Items from the List";
        Let x, rStart, rStop, and nextUserAction be integers;

        Accept user input for rStart and rStop;

        while(rStop <rStart or rStart <0) do the following:
        Show error message;
        Accept input for rStart and rStop;
        End while

        removalPrompt = "Items " + rStart + " to " + rStop + " are about to be removed from the
        list.\n" + "Click Yes to remove the items. Click No or Cancel to exit.";
        Accept user input for nextUserAction;

        if(nextUserAction = Yes Option) do the following:
        for(x = rStart to rStop incrementing by 1) do the following:
        countriesList.remove(x);

        End for
        End if

STOP
        B7. The checkSize(CountriesLinkedList thisList) Method
START
        Let Output be a JOptionPane output message;
        Output = "There are " + thisList.getSize() + " countries in the list";
STOP
        B8. The initializeList() Method
START
        countriesList = new CountriesLinkedList();
STOP
        B9. The empty() Method
START
        Let x and nextUserAction be integers;
        Let removalPrompt be a string;
        removalPrompt = "You are about to empty the list. " + "Click Yes to Empty. Click No or
        Cancel to exit.";
        nextUserAction = JOptionPane.showConfirmDialog(null, removalPrompt);
        If nextUserAction == JOptionPane.YES_OPTION do the following:
        countriesList.clearList();
        End if;
STOP
        B10. The SummarizeCountries(CountryLinkedList thisList) Method
START
```

Let x cLim be integers;
Let thisList be a Linked List of country objects
Let outputS be a string initialized to blanks
Set cLim to the size of thisList
initializeSummary();
for(x = 1 to cLim with increments of 1) do the following
Add thisList.getInfo(x -1).getPCI() to totalPCI
highLow(thisList.getInfo(x-1)
End for
averagePCI = totalPCI/cLim
stdDevPCI = standardDev(thisList, cLim, averagePCI)
Append richestC.printMe() to outputS
Append poorestC.printMe() to outputS
Append “total PCI: “ + totalPCI to outputS
Append “average PCI: “ + averagePCI to outputS
Append “standard deviation: “ + stdDevPCI to outputS
Display(outputS)

STOP

B11. The highLow(Country thisCountry) Method

START

Let thisCountry be a Country instance;
If thisCountry.getPCI() > richestC.getPCI()
richestC.modifyMe(thisCountry)
End if
If thisCountry.getPCI() < poorestC.getPCI()
poorestC.modifyMe(thisCountry)
End if

STOP

B12. The initializeSummary() Method

START

Instantiate richestC, poorestC
richestC.cPCI to smallest possible value
poorestC.cPCI to largest possible value
Set totalPCI, averagePCI, stdDevPCI to zero

STOP

C. The CountriesLinkedList Class

CountriesLinkedList
Protected CountryNode nFirst, nLast; Protected int length;
Public CountriesLinkedList(); Public void addFirst(Country thisCountry); Public void addLast(Country thisCountry); Public void addMiddle(int pos, Country thisCountry);

```
Public void removeFirst();
Public void removeLast();
Public void removeMiddle(int pos);
Public void modifyMe(int pos, Country thisCountry);
Public getSize();
Public void clearList();
Public Country getInfo(int pos);
Public Country[] toArray();
Protected void finalize()throws java.lang.Throwable;
Protected void destroyMe(Object thisObj);
```

C1. The CountriesLinkedList() Method

START

Set nFirst = nLast = null;
Set length = 0;

STOP

C2. The addFirst(Country thisCountry) Method

START

Declare newNode as a new CountryNode;
Set the newNode info to the thisCountry value;
Set the newNode.nNext to nFirst;
Set nFirst = newNode;
Increment length by one;
If length is 1 then nLast = nFirst;

STOP

C3. The addLast(Country thisCountry) method

START

Declare newNode as a new CountryNode;
Set the newNode info to the value of thisCountry;
Set nLast.nNext to newNode value;
Set newNode.nNext = null;
Set nLast to newNode;
Increment length by 1
If length is 1 then set nFirst = nLast;

STOP

C4. The addMiddle(int pos, Country thisCountry) Method

START

Let x be an Integer;
Let nMark2 be a new CountryNode = nFirst;
Let nMark1 be a new CountryNode = null;
If pos is 1 then call addFirst for thisCountry;
Otherwise
for(x = 1 to pos, increment x by 1) do the following
If nMark2.nNext is null, break;
otherwise

```
        nMark1 = nMark2
        nMark2 = nMark2.nNext;
        End if
        Declare newNode as a new CountryNode();
        Set newNode.nInfo to modifyMe of thisCountry;
        Set newNode.nNext = nMark2;
        Set nMark1.nNext = newNode;
        Increment length by 1;
        End if
STOP
        C5. The removeFirst() Method
START
        Declare nCurrent as a new CountryNode equal to nFirst;
        Set nFirst = nFirst.nNext;
        Call destroyMe for nCurrent;
        Decrement length by 1;
STOP
        C6. The removeLast() Method
START
        Let nCurrent and nPenultimate be new CountryNodes;
        If (nFirst equals nLast) then;
        nCurrent = nLast;
        nFirst = nLast = null;
        Call destroyMe for nCurrent;
        End Then
        Otherwise
        nPenultimate = nFirst;
        while(nPenultimate.nNext != nLast)
        Do
        nPenultimate = nPenultimate.nNext;
        Endwhile
        nCurrent = nLast;
        nPenultimate.nNext = null;
        Call destroyNe(nCurrent);
        nLast = nPenultimate;
STOP
        C7.The removeMiddle(int pos) Method
START
        Declare int x = 1;
        Declare CountryNode nCurrent = nFirst;
        Declare CountryNode prevCurrent = nFirst;
        If(pos is 1) then call removeFirst()
        If(pos equals length and nFirst does not equal nLast) call removeLast;
        If pos does not equal 1 and pos does not equal length
```

```
        Then
        while(nCurrent.Next is not null and x < pos)
        Do
        prevCurrent = nCurrent;
        nCurrent = nCurrent.nNext;
        Increment x;
        End while
        prevCurrent.nNext = nCurrent.nNext;
        Call destroyMe for nCurrent;
        if (prevCurrent.nNext is null) then let nLast = prevCurrent;
        Decrement length;
STOP
        C8. The modifyMe(int pos, Country thisCountry) Method
START
        Declare int x = 1;
        Declare a CountryNode nCurrent = nFirst;
        while(nCurrent.nNext is not null and x < pos);
        Do;
        nCurrent = nCurrent.nNext;
        Increment x;
        End while;
        nCurrent.nInfo.modifyMe for thisCountry;
STOP
        C9. The getSize() Method;
START
        Return length;
STOP

        C10. The clearList() Method
START
        Declare CountryNode nCurrent = nFirst;
        Declare CountryNode prevCurrent = nFirst;
        while(nCurrent is not null)
        Do
        prevCurrent = nCurrent;
        nCurrent = nCurrent.nNext;
        Call destroyMe() for prevCurrent;
        End while
        nFirst = nLast = null;
        Length = 0;
STOP
        C11. The getInfo(int pos) Method
START
        Declare int x = 1;
```

Declare Country [] tempList = new Country[length];
Declare tempList = toArray();
Return tempList[pos];
STOP

C12. The toArray() Method

START
Declare int x = 1;
Declare Country[] countryArray = new Country[length];
Declare CountryNode nCurrent = nFirst;
for(x =1 to nCurrent is a positive number and x to length incrementing x by 1) do
Set CountryArray[x-1] = new Country();
Set countryArray[x-1] to nCurrent.nInfo;
Set nCurrent = nCurrent.nNext;
End for
Return countryArray;
STOP

C13. The finalize() Method

START
Call destroyMe for this
STOP

C14. The destroyMe(Object thisObj) Method

START
Set thisObj = null;
Call System.gc();
STOP

D. The CountriesNode Class

CountriesNode
Protected Country nInfo; Protected CountryNode nNext;
Public CountryNode(); Public void modifyMe(CountryNode thisNode); Public void inputData(int x); Public String printMe();

D1. The CountryNode() Method

START
Set nInfo = new Country();
Set nNext = null;
STOP

D2. The modifyMe(CountryNode thisNode) Method

START

Set nInfo.modifyMe to thisNode.Info;

Set nNext to thisNode.nNext;

STOP

D3. The inputData(int x) Method

START

Get nInfo or position of x;

Set nNext = null;

STOP

D4. The printMe() Method

START

Return nInfo;

STOP