```
Script started on 2022-12-08 14:52:30-06:00 [TERM="xterm" TTY="/dev/pts/8" COLUMNS=
j_pec2@ares:~/JPMainDir/CSC122/Port3/animallab$ pwd
/home/students/j_pec2/JPMainDir/CSC122/Port3/animallab
j_pec2@ares:~/JPMainDir/CSC122/Port3/animallab$ cat Animalnfo.txt
Jack Pec

CSC122-001

Animal Lab



Overall level 4


Desc:

It's the "Survial of the fittest?"
labj_pec2@ares:~/JPMainDir/CSC122/Port3/animallab$ show-code AnimalLabDriverV2.cpp


AnimalLabDriverV2.cpp:
```

```cpp
#include <iostream>
#include <string>
#include <vector>
#include "randVal.h"
#include "animalV2.h"

using namespace std;

int main(void)
{

    vector<prey> preylist;
    vector<predator> predatorlist;

    string preyName;
    string predatorName;

    long preyPop;
    long predPop;

    long speedLower;
    long speedUpper;

    long foodUpper;
    long foodLower;

    long birthUpperPrey;
    long birthLowerPrey;

    long deathUpperPrey;
    long deathLowerPrey;

    long birthUpperPred;
    long birthLowerPred;

    long deathUpperPred;
    long deathLowerPred;

    long hungerUpper;
    long hungerLower;

    long numOfPredEats;

    size_t gen;

    cout << "Enter prey name: ";
    cin >> preyName;

    cout << "Enter predator name: ";
    cin >> predatorName;

    cout << "Enter Prey population: ";
    cin >> preyPop;

    cout << "Enter Predator population: ";
    cin >> predPop;


    cout << "Enter how many generations: ";
    cin >> gen;

    cout << "Enter lower bound for speed: ";
    cin >> speedLower;
    cout << "Enter Upper bound for speed: ";
    cin >> speedUpper;
    cout << "Enter lower bound for food: ";
    cin >> foodLower;
    cout << "Enter Upper bound for food: ";
    cin >> foodUpper;


    cout << "\nFor Prey\n";
    cout << "Enter lower bound for birthrate: ";
    cin >> birthLowerPrey;
    cout << "Enter Upper bound for birthrate: ";
    cin >> birthUpperPrey;

    cout << "Enter lower bound for death rate: ";
    cin >> deathLowerPrey;
    cout << "Enter Upper bound for death rate: ";
    cin >> deathUpperPrey;

    cout << "\nFor Predators\n";
    cout << "Enter lower bound for birthrate: ";
```

```
    cin >> birthLowerPred;
    cout << "Enter Upper bound for birthrate: ";
    cin >> birthUpperPred;

    cout << "Enter lower bound for death rate: ";
    cin >> deathLowerPred;
    cout << "Enter Upper bound for death rate: ";
    cin >> deathUpperPred;


    //when pred hunger becomes  < 0, they stop eating
    cout << "Enter lower bound for hunger for predators: ";
    cin >> hungerLower;
    cout << "Enter Upper bound for hunger for predators: ";
    cin >> hungerUpper;

    cout << "Enter Upper bound how many predators could eat prey: ";
    cin >> numOfPredEats;

    //sets up beginning pops
    for(size_t i = 0; i < static_cast<size_t>(preyPop); i++)
    {
        prey temp1(preyName,
                   rand_range(static_cast<long>(speedLower),
                              static_cast<long>(speedUpper)),
                   rand_range(static_cast<long>(foodLower),
                              static_cast<long>(foodUpper)));

        preylist.push_back(temp1);

    }

    for(size_t i = 0; i < static_cast<size_t>(predPop); i++)
    {
        long predHunger = rand_range(hungerLower,hungerUpper);

        long predSpeed = rand_range(speedLower,speedUpper);

        predator temp2(predatorName,
                       predSpeed,
                       predHunger);

        predatorlist.push_back(temp2);

    }









    std::cout << "Initial Predator Pop: " << predatorlist.size() << "\n";
    std::cout << "Initial Prey Pop: " << preylist.size() << "\n";
```

```


    // main do loop
    do
    {

        for(size_t i = 0; i < static_cast<size_t>(
                    rand_range(1, numOfPredEats)); i++ )
        {

            if(predatorlist.size() > 0 && preylist.size() > 0)
            {
                //get's a random index in prey list
                size_t k = static_cast<size_t>(
                                rand_range(0,
                                static_cast<long>(preylist.size()-1)));

                //get's a random index in predator list
                size_t p = static_cast<size_t>(
                                rand_range(0,
                                static_cast<long>(predatorlist.size()-1)));


                // predator will only attempt to eat if they
                //still have hunger
                //and if true..
                if(predatorlist[p].eat(preylist[k]))
                {
                    preylist.erase(preylist.begin() + k);

                }


                //hunger reset


                for(size_t b = 0; b <  predatorlist.size(); b++ )
                {
                    predatorlist[b].resetHunger();
                    //reset to hunger they had
                    //when formed in list

                }
            }

        }


        //deathrate

        //prey
        for(size_t i = 0; i < static_cast<size_t>(
```

```
                    rand_range(deathLowerPrey, deathUpperPrey)); i++ )
        {

            if(preylist.size() > 0)
            {
                preylist.pop_back();
            }
        }

        //pred
        for(size_t i = 0; i < static_cast<size_t>(
                    rand_range(deathLowerPred, deathUpperPred)); i++ )
        {

            if(predatorlist.size() > 0)
            {
                predatorlist.pop_back();
            }
        }


        //birthrate

        //prey
        for(size_t i = 0; i < static_cast<size_t>(
                    rand_range(birthLowerPrey,birthUpperPrey)); i++ )
        {

            //long predandpreyBirth = rand_range(birthLower,birthUpper);

            //long predHunger = rand_range(hungerLower,hungerUpper);

            //long predSpeed = rand_range(speedLower,speedUpper);

            prey temp1(preyName,rand_range(static_cast<long>(speedLower),
                                           static_cast<long>(speedUpper)),
                       rand_range(static_cast<long>(foodLower),
                                  static_cast<long>(foodUpper)));

            preylist.push_back(temp1);

        }

        //pred
        for(size_t i = 0; i < static_cast<size_t>(
                    rand_range(birthLowerPred, birthUpperPred)); i++ )
        {
            long predSpeed = rand_range(speedLower,speedUpper);

            long predHunger = rand_range(hungerLower,hungerUpper);

            predator temp2(predatorName,
                           predSpeed,
                           predHunger);

            predatorlist.push_back(temp2);


        }


        std::cout << "Number of predators left: "
                  << predatorlist.size() << "\n";

        std::cout << "Number of prey left: " << preylist.size() << "\n";


        --gen;
    }
    while(!predatorlist.empty() && !preylist.empty() && gen != 0);

    return 0;
}
```

```
j_pec2@ares:~/JPMainDir/CSC122/Port3/animallab$ ls
AnimalLabDriverV2.cpp  AnimalTPQ.txt  randVal.h
Animalnfo.txt          animalV2.h     typescript
j_pec2@ares:~/JPMainDir/CSC122/Port3/animallab$ show-code animalV2.h
```

animalV2.h:

```
/*

Animal Lib


*/
#pragma once

#include <string>


class baseAnimal
{
    // int food;
    std::string name = "empty";
    long speed;
    // long birthrate;


public:
    baseAnimal(std::string nameIn, long speedIn = 0)
        :
        name(nameIn),
        speed(speedIn)
```

```
        //  birthrate(val2)

    {
        //   cerr << "base created:  " << this << '\n';
    }
    baseAnimal(const baseAnimal & b)
        :
        name(b.name),
        speed(b.speed)
    {
        //   cerr << "base (copy) created:  " << this << '\n';
    }
    virtual ~baseAnimal(void)
    {
        //   cerr << "base destroyed (" << this << ")\n";
    }

    baseAnimal & operator=(const baseAnimal & c) = default;


    //getters and setters
    long get_speed(void) const
    {

        return speed;
    }

    bool set_speed(long val)
    {
        bool okay = false;

        if(val >=0 )  //hardcoded
        {
            speed = val;
            okay = true;
        }

        return okay;
    }


    std::string get_name(void) const
    {

        return name;
    }

    void set_name(std::string nameIN)
    {
        name = nameIN;
    }


};


class prey : public baseAnimal
{
    long food;

public:
    prey(std::string nameIn,long speedIn = 0,long foodIn = 0)
        :
        baseAnimal(nameIn,speedIn),
        food(foodIn)

    {
        //   cerr << "prey created:  " << this << '\n';
    }
    prey(const prey & b)
        :
        baseAnimal(b),
        food(b.food)
    {
        //   cerr << "prey (copy) created:  " << this << '\n';
    }
    virtual ~prey(void)
    {
        //    cerr << "prey destroyed (" << this << ")\n";
    }

    prey & operator=(const prey & c) = default;


    //getters and setters
    long get_food(void) const
    {

        return food;
    }

    bool set_food(long val)
    {
        bool okay = false;

        if(val >=0 )  //hardcoded
        {
            food = val;
            okay = true;
        }

        return okay;
```

```
    }



};

class predator : public baseAnimal
{
    long maxHunger;
    long hunger;


public:
    predator(std::string nameIn, long speedIn = 0,long hungerIn = 0)
        :
        baseAnimal(nameIn,speedIn),
        maxHunger(hungerIn),
        hunger(hungerIn)


    {
        //   cerr << "predator created:  " << this << '\n';
    }
    predator(const predator & b)
        :
        baseAnimal(b),
        maxHunger(b.maxHunger),
        hunger(b.hunger)

    {
        //   cerr << "predator (copy) created:  " << this << '\n';
    }
    virtual ~predator(void)
    {
        //   cerr << "predator destroyed (" << this << ")\n";
    }

    predator & operator=(const predator & c) = default;

    //getters and setters
    long get_hunger(void) const
    {

        return hunger;
    }

    bool set_hunger(long val)
    {
        bool okay = false;

        if(val >=0 )  //hardcoded
        {
            hunger = val;
            okay = true;
        }

        return okay;
    }


    void resetHunger()
    {
        hunger = maxHunger;
    }

    //stops being called when hunger is less than or equal to 0
    bool eat(prey & p)
    {
        bool returnVal = false;

        if(baseAnimal::get_speed() > p.baseAnimal::get_speed()
                && hunger > 0)
        {
            hunger -= p.get_food();
            returnVal = true;

        }

        return returnVal;

    }



};
```

```
j_pec2@ares:~/JPMainDir/CSC122/Port3/animallab$ ls
AnimalLabDriverV2.cpp  AnimalTPQ.txt  randVal.h
Animalnfo.txt          animalV2.h     typescript
j_pec2@ares:~/JPMainDir/CSC122/Port3/animallab$ show-code randVal.h
```

randVal.h:

```
/*

Random Lib


*/
#pragma once
#include <iostream>
//#include
//#include <string>

//Random whole Nums
inline long rand_range(long min, long max)
```

```
    {
        return rand()/(RAND_MAX / (max-min+1) + 1) + min;
    }

    //Random Decimal Numbers
    inline double rand_01(void)
    {
        //This gives a warning

        /*
        warning: conversion
        from long int to double may
        change value [-Wconversion]
        21 | return rand_range(0L,
        RAND_MAX-1L)/(RAND_MAX-1.0);

        Don't know how to fix it
        */

        return static_cast<double>(rand_range(0L, RAND_MAX-1L))
               /(static_cast<double>(RAND_MAX)-1.0);
    }

    inline double rand_range(double min, double max)
    {
        return rand_01() * (max-min) + min;
    }

    //Random Char Values
    inline char rand_range(char min, char max)
    {
        return static_cast<char>(rand_range(static_cast<long>(min),
                                            static_cast<long>(max)));
    }

    //Random Action Occurence
    // probability is expected to be a standard [0, 1] value
    inline bool event_occurred(double probability)
    {
        return rand_01() <= probability;
    }

    inline bool flip_coin(double chance_heads = 0.5)  // fair coin
    {
        return event_occurred(chance_heads);
    }
j_pec2@ares:~/JPMainDir/CSC122/Port3/animallab$ lss
AnimalLabDriverV2.cpp  AnimalTPQ.txt  randVal.h
Animalnfo.txt          animalV2.h     typescript
j_pec2@ares:~/JPMainDir/CSC122/Port3/animallab$ CPP AnimalLabDriverV2.cpp animalV2

AnimalLabDriverV2.cpp***
```

```
j_pec2@ares:~/JPMainDir/CSC122/Port3/animallab$ ./AnimalLabDriverV2.ou
Enter prey name: Rabbit
Enter predator name: Fox
Enter Prey population: 100
Enter Predator population: 50
Enter how many generations: 100
Enter lower bound for speed: 3
Enter Upper bound for speed: 5
Enter lower bound for food: 3
Enter Upper bound for food: 6

For Prey
Enter lower bound for birthrate: 3
Enter Upper bound for birthrate: 4
Enter lower bound for death rate: 2
Enter Upper bound for death rate: 3

For Predators
Enter lower bound for birthrate: 2
Enter Upper bound for birthrate: 3
Enter lower bound for death rate: 1
Enter Upper bound for death rate: 2
Enter lower bound for hunger for predators: 9
Enter Upper bound for hunger for predators: 12
Enter Upper bound how many predators could eat prey: 10
Initial Predator Pop: 50
Initial Prey Pop: 100
Number of predators left: 51
Number of prey left: 100
Number of predators left: 53
Number of prey left: 102
Number of predators left: 53
Number of prey left: 102
Number of predators left: 55
Number of prey left: 104
Number of predators left: 56
Number of prey left: 105
Number of predators left: 57
Number of prey left: 105
Number of predators left: 57
Number of prey left: 104
Number of predators left: 58
Number of prey left: 105
Number of predators left: 58
Number of prey left: 106
Number of predators left: 58
Number of prey left: 103
Number of predators left: 58
Number of prey left: 101
Number of predators left: 58
Number of prey left: 100
Number of predators left: 58
Number of prey left: 98
Number of predators left: 59
```

```
Number of prey left: 98
Number of predators left: 61
Number of prey left: 100
Number of predators left: 63
Number of prey left: 98
Number of predators left: 65
Number of prey left: 100
Number of predators left: 65
Number of prey left: 102
Number of predators left: 66
Number of prey left: 104
Number of predators left: 68
Number of prey left: 105
Number of predators left: 69
Number of prey left: 106
Number of predators left: 71
Number of prey left: 102
Number of predators left: 72
Number of prey left: 102
Number of predators left: 73
Number of prey left: 103
Number of predators left: 74
Number of prey left: 102
Number of predators left: 75
Number of prey left: 103
Number of predators left: 77
Number of prey left: 102
Number of predators left: 78
Number of prey left: 104
Number of predators left: 80
Number of prey left: 103
Number of predators left: 80
Number of prey left: 102
Number of predators left: 81
Number of prey left: 103
Number of predators left: 83
Number of prey left: 103
Number of predators left: 85
Number of prey left: 102
Number of predators left: 86
Number of prey left: 102
Number of predators left: 87
Number of prey left: 102
Number of predators left: 87
Number of prey left: 101
Number of predators left: 87
Number of prey left: 103
Number of predators left: 89
Number of prey left: 103
Number of predators left: 91
Number of prey left: 103
Number of predators left: 91
Number of prey left: 103
Number of predators left: 93
```

```
Number of prey left: 103
Number of predators left: 95
Number of prey left: 103
Number of predators left: 96
Number of prey left: 102
Number of predators left: 96
Number of prey left: 103
Number of predators left: 96
Number of prey left: 103
Number of predators left: 96
Number of prey left: 104
Number of predators left: 97
Number of prey left: 104
Number of predators left: 97
Number of prey left: 104
Number of predators left: 98
Number of prey left: 105
Number of predators left: 100
Number of prey left: 106
Number of predators left: 100
Number of prey left: 107
Number of predators left: 102
Number of prey left: 106
Number of predators left: 103
Number of prey left: 107
Number of predators left: 104
Number of prey left: 107
Number of predators left: 106
Number of prey left: 107
Number of predators left: 107
Number of prey left: 107
Number of predators left: 107
Number of prey left: 109
Number of predators left: 108
Number of prey left: 110
Number of predators left: 109
Number of prey left: 110
Number of predators left: 110
Number of prey left: 108
Number of predators left: 110
Number of prey left: 108
Number of predators left: 110
Number of prey left: 109
Number of predators left: 112
Number of prey left: 111
Number of predators left: 114
Number of prey left: 111
Number of predators left: 114
Number of prey left: 113
Number of predators left: 114
Number of prey left: 115
Number of predators left: 114
Number of prey left: 117
Number of predators left: 115
```

```
Number of prey left: 118
Number of predators left: 117
Number of prey left: 117
Number of predators left: 119
Number of prey left: 119
Number of predators left: 121
Number of prey left: 119
Number of predators left: 122
Number of prey left: 119
Number of predators left: 123
Number of prey left: 120
Number of predators left: 124
Number of prey left: 121
Number of predators left: 125
Number of prey left: 121
Number of predators left: 126
Number of prey left: 122
Number of predators left: 126
Number of prey left: 124
Number of predators left: 127
Number of prey left: 124
Number of predators left: 127
Number of prey left: 125
Number of predators left: 128
Number of prey left: 124
Number of predators left: 129
Number of prey left: 124
Number of predators left: 130
Number of prey left: 124
Number of predators left: 130
Number of prey left: 124
Number of predators left: 130
Number of prey left: 126
Number of predators left: 130
Number of prey left: 125
Number of predators left: 130
Number of prey left: 127
Number of predators left: 130
Number of prey left: 128
Number of predators left: 131
Number of prey left: 129
Number of predators left: 132
Number of prey left: 130
Number of predators left: 133
Number of prey left: 128
Number of predators left: 135
Number of prey left: 128
Number of predators left: 137
Number of prey left: 128
Number of predators left: 137
Number of prey left: 129
Number of predators left: 138
Number of prey left: 129
Number of predators left: 140
Number of prey left: 129
Number of predators left: 141
Number of prey left: 129
Number of predators left: 142
Number of prey left: 127
Number of predators left: 144
Number of prey left: 127
Number of predators left: 144
Number of prey left: 128
Number of predators left: 145
Number of prey left: 130
j_pec2@ares:~/JPMainDir/CSC122/Port3/animallab$ ./AnimalLabDriverV2.out
Enter prey name: Rabbit
Enter predator name: Fox
Enter Prey population: 1000
Enter Predator population: 50
Enter how many generations: 100
Enter lower bound for speed: 3
Enter Upper bound for speed: 6
Enter lower bound for food: 3
Enter Upper bound for food: 4

For Prey
Enter lower bound for birthrate: 3
Enter Upper bound for birthrate: 4
Enter lower bound for death rate: 6
Enter Upper bound for death rate: 7

For Predators
Enter lower bound for birthrate: 3
Enter Upper bound for birthrate: 4
Enter lower bound for death rate: 1
Enter Upper bound for death rate: 2
Enter lower bound for hunger for predators: 10
Enter Upper bound for hunger for predators: 15
Enter Upper bound how many predators could eat prey: 20
Initial Predator Pop: 50
Initial Prey Pop: 1000
Number of predators left: 53
Number of prey left: 993
Number of predators left: 55
Number of prey left: 988
Number of predators left: 58
Number of prey left: 981
Number of predators left: 61
Number of prey left: 977
Number of predators left: 63
Number of prey left: 973
Number of predators left: 66
Number of prey left: 970
Number of predators left: 67
Number of prey left: 966
Number of predators left: 69
Number of prey left: 962
```

```
Number of predators left: 72
Number of prey left: 955
Number of predators left: 74
Number of prey left: 949
Number of predators left: 76
Number of prey left: 944
Number of predators left: 77
Number of prey left: 936
Number of predators left: 80
Number of prey left: 931
Number of predators left: 81
Number of prey left: 926
Number of predators left: 84
Number of prey left: 921
Number of predators left: 85
Number of prey left: 916
Number of predators left: 86
Number of prey left: 912
Number of predators left: 89
Number of prey left: 908
Number of predators left: 92
Number of prey left: 901
Number of predators left: 94
Number of prey left: 896
Number of predators left: 95
Number of prey left: 892
Number of predators left: 97
Number of prey left: 884
Number of predators left: 99
Number of prey left: 876
Number of predators left: 101
Number of prey left: 868
Number of predators left: 104
Number of prey left: 862
Number of predators left: 107
Number of prey left: 856
Number of predators left: 110
Number of prey left: 851
Number of predators left: 113
Number of prey left: 849
Number of predators left: 116
Number of prey left: 842
Number of predators left: 119
Number of prey left: 838
Number of predators left: 121
Number of prey left: 832
Number of predators left: 123
Number of prey left: 829
Number of predators left: 126
Number of prey left: 826
Number of predators left: 128
Number of prey left: 820
Number of predators left: 130
Number of prey left: 814
```

```
Number of predators left: 131
Number of prey left: 807
Number of predators left: 132
Number of prey left: 802
Number of predators left: 135
Number of prey left: 795
Number of predators left: 137
Number of prey left: 791
Number of predators left: 139
Number of prey left: 788
Number of predators left: 141
Number of prey left: 783
Number of predators left: 143
Number of prey left: 779
Number of predators left: 146
Number of prey left: 773
Number of predators left: 149
Number of prey left: 765
Number of predators left: 151
Number of prey left: 762
Number of predators left: 154
Number of prey left: 756
Number of predators left: 156
Number of prey left: 753
Number of predators left: 159
Number of prey left: 750
Number of predators left: 162
Number of prey left: 745
Number of predators left: 164
Number of prey left: 742
Number of predators left: 165
Number of prey left: 738
Number of predators left: 168
Number of prey left: 731
Number of predators left: 169
Number of prey left: 728
Number of predators left: 172
Number of prey left: 725
Number of predators left: 174
Number of prey left: 722
Number of predators left: 176
Number of prey left: 714
Number of predators left: 178
Number of prey left: 710
Number of predators left: 179
Number of prey left: 705
Number of predators left: 182
Number of prey left: 700
Number of predators left: 183
Number of prey left: 696
Number of predators left: 184
Number of prey left: 690
Number of predators left: 187
Number of prey left: 684
```

```
Number of predators left: 189
Number of prey left: 677
Number of predators left: 191
Number of prey left: 673
Number of predators left: 192
Number of prey left: 668
Number of predators left: 194
Number of prey left: 663
Number of predators left: 195
Number of prey left: 659
Number of predators left: 197
Number of prey left: 656
Number of predators left: 200
Number of prey left: 653
Number of predators left: 202
Number of prey left: 649
Number of predators left: 204
Number of prey left: 645
Number of predators left: 205
Number of prey left: 641
Number of predators left: 206
Number of prey left: 636
Number of predators left: 208
Number of prey left: 630
Number of predators left: 210
Number of prey left: 627
Number of predators left: 211
Number of prey left: 622
Number of predators left: 214
Number of prey left: 616
Number of predators left: 216
Number of prey left: 610
Number of predators left: 218
Number of prey left: 606
Number of predators left: 219
Number of prey left: 600
Number of predators left: 222
Number of prey left: 593
Number of predators left: 225
Number of prey left: 584
Number of predators left: 226
Number of prey left: 576
Number of predators left: 228
Number of prey left: 574
Number of predators left: 229
Number of prey left: 568
Number of predators left: 231
Number of prey left: 563
Number of predators left: 233
Number of prey left: 557
Number of predators left: 235
Number of prey left: 553
Number of predators left: 236
Number of prey left: 548
```

```
Number of predators left: 239
Number of prey left: 543
Number of predators left: 240
Number of prey left: 536
Number of predators left: 241
Number of prey left: 529
Number of predators left: 244
Number of prey left: 522
Number of predators left: 247
Number of prey left: 520
Number of predators left: 250
Number of prey left: 517
Number of predators left: 253
Number of prey left: 512
Number of predators left: 256
Number of prey left: 509
Number of predators left: 259
Number of prey left: 502
Number of predators left: 260
Number of prey left: 497
Number of predators left: 262
Number of prey left: 489
j_pec2@ares:~/JPMainDir/CSC122/Port3/animallab$ ./AnimalLabDriverV2.out
Enter prey name: Rabbit
Enter predator name: Fox
Enter Prey population: 100
Enter Predator population: 100
Enter how many generations: 100
Enter lower bound for speed: 3
Enter Upper bound for speed: 6
Enter lower bound for food: 3
Enter Upper bound for food: 4

For Prey
Enter lower bound for birthrate: 1
Enter Upper bound for birthrate: 2
Enter lower bound for death rate: 3
Enter Upper bound for death rate: 4

For Predators
Enter lower bound for birthrate: 1
Enter Upper bound for birthrate: 2
Enter lower bound for death rate: 3
Enter Upper bound for death rate: 4
Enter lower bound for hunger for predators: 10
Enter Upper bound for hunger for predators: 15
Enter Upper bound how many predators could eat prey: 10
Initial Predator Pop: 100
Initial Prey Pop: 100
Number of predators left: 98
Number of prey left: 95
Number of predators left: 96
Number of prey left: 91
Number of predators left: 95
```

```
Number of prey left: 87
Number of predators left: 93
Number of prey left: 84
Number of predators left: 90
Number of prey left: 78
Number of predators left: 89
Number of prey left: 77
Number of predators left: 87
Number of prey left: 75
Number of predators left: 85
Number of prey left: 73
Number of predators left: 84
Number of prey left: 70
Number of predators left: 83
Number of prey left: 69
Number of predators left: 81
Number of prey left: 65
Number of predators left: 79
Number of prey left: 61
Number of predators left: 78
Number of prey left: 59
Number of predators left: 76
Number of prey left: 55
Number of predators left: 74
Number of prey left: 51
Number of predators left: 72
Number of prey left: 50
Number of predators left: 71
Number of prey left: 48
Number of predators left: 69
Number of prey left: 45
Number of predators left: 67
Number of prey left: 43
Number of predators left: 65
Number of prey left: 40
Number of predators left: 63
Number of prey left: 38
Number of predators left: 61
Number of prey left: 37
Number of predators left: 59
Number of prey left: 34
Number of predators left: 58
Number of prey left: 31
Number of predators left: 56
Number of prey left: 30
Number of predators left: 54
Number of prey left: 26
Number of predators left: 53
Number of prey left: 24
Number of predators left: 50
Number of prey left: 23
Number of predators left: 48
Number of prey left: 21
Number of predators left: 46
```

```
Number of prey left: 19
Number of predators left: 45
Number of prey left: 17
Number of predators left: 44
Number of prey left: 15
Number of predators left: 43
Number of prey left: 14
Number of predators left: 41
Number of prey left: 12
Number of predators left: 40
Number of prey left: 11
Number of predators left: 37
Number of prey left: 9
Number of predators left: 34
Number of prey left: 7
Number of predators left: 32
Number of prey left: 6
Number of predators left: 31
Number of prey left: 3
Number of predators left: 30
Number of prey left: 1
Number of predators left: 29
Number of prey left: 1
Number of predators left: 27
Number of prey left: 1
Number of predators left: 25
Number of prey left: 2
Number of predators left: 23
Number of prey left: 1
Number of predators left: 21
Number of prey left: 2
Number of predators left: 19
Number of prey left: 1
Number of predators left: 18
Number of prey left: 2
Number of predators left: 16
Number of prey left: 1
Number of predators left: 14
Number of prey left: 1
Number of predators left: 11
Number of prey left: 1
Number of predators left: 9
Number of prey left: 1
Number of predators left: 8
Number of prey left: 1
Number of predators left: 6
Number of prey left: 1
Number of predators left: 4
Number of prey left: 1
Number of predators left: 2
Number of prey left: 2
Number of predators left: 1
Number of prey left: 2
Number of predators left: 1
```

```
Number of prey left: 1
Number of predators left: 2
Number of prey left: 2
Number of predators left: 1
Number of prey left: 1
Number of predators left: 1
Number of prey left: 2
Number of predators left: 2
Number of prey left: 2
Number of predators left: 2
Number of prey left: 2
Number of predators left: 2
Number of prey left: 1
Number of predators left: 2
Number of prey left: 1
Number of predators left: 2
Number of prey left: 1
Number of predators left: 1
Number of prey left: 1
Number of predators left: 2
Number of prey left: 2
Number of predators left: 2
Number of prey left: 2
Number of predators left: 1
Number of prey left: 1
Number of predators left: 1
Number of prey left: 1
Number of predators left: 1
Number of prey left: 2
Number of predators left: 1
Number of prey left: 2
Number of predators left: 2
Number of prey left: 2
Number of predators left: 1
Number of prey left: 1
Number of predators left: 2
Number of prey left: 1
Number of predators left: 2
Number of prey left: 1
Number of predators left: 2
Number of prey left: 1
Number of predators left: 1
Number of prey left: 1
Number of predators left: 1
Number of prey left: 1
Number of predators left: 1
Number of prey left: 1
Number of predators left: 1
Number of prey left: 1
Number of predators left: 1
Number of prey left: 1
Number of predators left: 2
Number of prey left: 2
Number of predators left: 1
```

```
Number of prey left: 1
Number of predators left: 2
Number of prey left: 2
Number of predators left: 1
Number of prey left: 2
Number of predators left: 1
Number of prey left: 1
Number of predators left: 2
Number of prey left: 2
Number of predators left: 2
Number of prey left: 2
Number of predators left: 2
Number of prey left: 2
Number of predators left: 2
Number of prey left: 2
Number of predators left: 2
Number of prey left: 2
Number of predators left: 1
Number of prey left: 2
Number of predators left: 1
Number of prey left: 2
Number of predators left: 1
Number of prey left: 2
Number of predators left: 1
Number of prey left: 1
Number of predators left: 2
Number of prey left: 1
Number of predators left: 1
Number of prey left: 2
Number of predators left: 2
Number of prey left: 1
Number of predators left: 1
Number of prey left: 2
j_pec2@ares:~/JPMainDir/CSC122/Port3/animallab$ ls
AnimalLabDriverV2.cpp  AnimalnfoV2.txt  animalV2.h  typescript
AnimalLabDriverV2.out  AnimalTPQ.txt  randVal.h
j_pec2@ares:~/JPMainDir/CSC122/Port3/animallab$ cat AnimalTPQ.txt
1. How many hierarchies do you have? Why?
Just one, the base animal is the parent, and the predator
and prey classes are the children. I did this since it made
logical sense to me, predators and prey are both animals,
("is a" relationship) but not all animalsa are predators,
and vice versa.


2. How many classes are in the hierarchy(ies)?
How many levels does this hierarchy(ies) have?

3 classes, the baseAnimal class, the prey class
and the predator class.

the hiearchy has 2 levels I think.

3. What members did you make protected? Private?
```

I made everything private except getters and setters
and special functions as needed, since I think its good
practice to have the default be private for member vars.

4. What kind of inheritance mode(s) did you use for your inheritance?

class Child : public Parent

I did it this way since the children uses alot of data from the
parent's member vars (like speed).

5. Have you used any composition?
 Or is your entire program dependant on inheritance?

My entire program is dependant on inheritance

6. How many arrays do you have to
 hold your simulation's population? How 'weildy' is this?

I have two arrays, one for predators and one for prey.
I think its pretty weildy for this application.

7. What sort of initial counts cause predators to reign? Prey?