ITEC 120: Principles of Computer Science I

Homework 9 – Animal Island

>>>>>>>> **Due Date: Friday, March 30th at 10:00 PM via Desire2Learn** <<<<<<<

In doing this homework, remember to abide by the RU Honor Code.

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Problem 1
30 points

Two different types of animals have captured the world's attention. One is a herbivore and the other is a carnivore. They provide endless hours of entertainment via video games simulating their behavior, and provide excellent medical and nutritional opportunities as well. Given the demand for creating more of these animals, you have been hired to create software that will tell investors whether or not a particular island can sustain one of the animals over a specific period of time, and the number of animals that will exist on the island after a particular time. This program will also be used to provide a foundation for a gaming simulation of animals populating an island.

The cycle of life for the animals starts with eating once a month (if there aren't enough resources for all the animals, they all starve and die), and ends with breeding. When they breed, they split into two identical animals. The animals will live on a particular island, which has a certain number of resources available for the animals to consume. Islands are either can be normal, rocky, or grasslands. If a carnivore is put on a grassland island, it will consume twice as many resources as normal. If a herbivore is placed on a rocky island, it will consume twice as many resources as normal. By default, only one animal is placed on an island.

Input
Your program will read in a series of numbers and strings representing the simulation data. It will be given to your program in the following format:

```
<numberOfIslandsToConsider as an int>
<next set of statements repeated numberOfIslandsToConsider
times>
<numberOfMonthsInIsland'sTrial as an int>
<numberOfResourcesOnIsland as an int>
<islandType as a String>
<numberOfMonthsItTakesAnimalToReproduce as an int>
<numberOfResourceAnimalConsumesPerMonth as an int>
<typeOfAnimal as a String>
```

Computation
Your program will calculate life month by month on each island entered into the program. It must reduce the number of available resources, and then grow the number of

animals on the island properly. For example, if an animal consumes 1 resource a month and takes 1 month to breed, its first month on the island would consist of eating 1 and then splitting. The second month would see the animals consuming 2 resources (3 total consumed) and then splitting into 4 animals. When the term on an island is finished, your program must output how many animals exist on the island and how many resources are left. If the resources run out before the end of the term, then report how many animals died and which month they died.

Output
Output a header for the start of each island trial detailing the animal type, the duration of the trial, the number of resources on the island, and then the breeding time for the animal. Next, print out statistics for each month showing how many resources are consumed, how many are left, and whether or not the population expands that month and if so, how many animals are on the island after the split.

Sample input:
```
2
3
10
rocky
1
1
carnivore
5
10
rocky
2
1
herbivore
```

Output from previous commands:
```
Starting trial for a carnivore for 3 months with 10
resources and 1 month breeding time
Statistics for month 1
Animals consume 1 resources for this month, 9 are left
Animal population expands to 2 total animals on the island
Statistics for month 2
Animals consume 2 resources for this month, 7 are left
Animal population expands to 4 total animals on the island
Statistics for month 3
Animals consume 4 resources for this month, 3 are left
Animal population expands to 8 total animals on the island
Island can sustain animals for the specified time and there
are 8 animals on the island at the end of the trial
Number of resources left at end of term is 3
Starting trial for a herbivore for 5 months with 10
resources and 2 month breeding time
```

```
Statistics for month 1
Animals consume 2 resources for this month, 8 are left
Statistics for month 2
Animals consume 2 resources for this month, 6 are left
Animal population expands to 2 total animals on the island
Statistics for month 3
Animals consume 4 resources for this month, 2 are left
Statistics for month 4
2 animals died 5 months into their occupation due to
starvation
```

Testing note: your program must allow for a file to be redirected as input to the program (java programName < fileName.txt). If it does not, then you will receive a 0 on this program. As long as you use one scanner and pass it around as a parameter, this will not be a problem.

Constraints:
You must use at least one function in your solution, and must create two classes that represent the island and the animal population on the island. You must also submit a test case that is similar but not identical to the previous usage scenario. By doing so, you demonstrate that you have tested your program beyond the basics.

The reference solution for this project is 81 lines of code without comments. Feel free to use less or more code in your program.

Submission requirements:
You must submit the .java file containing your program to Desire 2 Learn under the Homework #9 assignment. If your submitted file does not compile, it will receive a 0. You can demo the homework the next school day after it is due, or it will be graded automatically. If you choose not to demo your homework you cannot contest the grade you receive.

Grading Rubric
15 Points – Does it properly determine whether or not animals survive and report the
            information properly?
5 Points - Is the program commented using inline and javadoc comments?
5 Points – Was a suitable test case submitted with the program?
5 Points – Are classes describing the animals and island implemented properly?