**Homework 3**

### **CMP 326: Programming Methods II**

Lehman College, City University of New York

Fall 2019

### [**Homework 3-1 Textbook Section 8.20**](https://learn.zybooks.com/zybook/CUNYCMP326Fall2019/chapter/8/section/20)

Create a class to represent an object of type Animal using the description provided below in UML

Animal

- name : String

- birthYear : int

- weight : double

- gender : char

+ Animal() // Set name="", birthYear=1900, weight=0.0, gender='u'

+ Animal(String, int, double, char)

+ getName() : String

+ setName(String) : void

+ getBirthYear() : int

+ setBirthYear(int) : void

+ getWeight() : double

+ setWeight(double) : void //if input value is negative, set weight to -1

+ getGender() : char

+ setGender(char) : void // if input value is not 'm' or 'f', set gender to 'u' (unknown)

+ calculateAge(int) : int // use birthYear and the argument of currentYear to calculate age.

// If currentYear < birthYear, return -1.

+ isMale() : boolean // return true if gender is 'm'

+ isFemale() : boolean // return true if gender is 'f'

+ printDetails() : void // prints Animal attributes in the following format:

// "Name: %20s | Year of Birth: %4d | Weight: %10.2f | Gender: %c\n"

+ gainWeight() : void //increase weight by 1.

+ gainWeight(double): void // increase weight by the input amount. Weight cannot drop below zero.

+ loseWeight() : void // decrease by 1. Weight cannot drop below zero.

+ loseWeight(double) : void // dncrease weight by the input amount. Weight cannot drop below zero.

View javadoc for Animal and Farm classes<http://comet.lehman.cuny.edu/sfakhouri/teaching/cmp/cmp326/s19/hw/hw3/>

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### [**Homework 3-2 Textbook Section 8.21**](https://learn.zybooks.com/zybook/CUNYCMP326Fall2019/chapter/8/section/21)

Create a class to represent a Farm object containing instances of the Animal objects

Farm

* animals : Animal [ ]
* farmName : String
* numAnimals : int //calculated controlled variable no setter
* Farm() //default 10 animals
* Farm(String) //default 10 animals
* Farm(int) //size of array
* Farm(String, int)
* addAnimal(Animal) : void
* getFarmName() : String
* setFarmName(String) : void
* getAnimal(int) : Animal //return null if index is invalid
* getNumAnimals() : int //notice no setter… this is a controlled variable
* getFirstAnimal() : Animal
* getLastAnimal() : Animal
* getAnimals() : Animal[ ]
* printAllDetails() : void // prints Farm attributes followed by Animal attributes as formatted below :

// "FarmName: %20s | Number of Animals: %4d | Farm Size: %4d\n"

// "Name: %20s | Year of Birth: %4d | Weight: %10.2f | Gender: %c\n"

* removeAnimal(int) : Animal
* removeAllAnimals() : void
* getTotalWeightOfAllAnimals() : double
* getAverageWeightOfAllAnimals() : double
* getNumberOfAnimalsAboveWeight(double) : int
* getNumberOfAnimalsBelowWeight(double) : int
* increaseWeightOfAllAnimals() : void
* increaseWeightOfAllAnimals(double) : void

View javadoc for Animal and Farm classes<http://comet.lehman.cuny.edu/sfakhouri/teaching/cmp/cmp326/s19/hw/hw3/>

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### [**Homework 3-3 Textbook Section 8.22**](https://learn.zybooks.com/zybook/CUNYCMP326Fall2019/chapter/8/section/22)

Create a Driver class to use your Farm and Animal classes and create instances of them.

In the main method do the following:

1. Create a Farm of size 10
2. Create 5 Animal Objects with the details specified in the table below
3. Add the 5 Animal objects to the Farm
4. Call the printDetails method from the Farm to print all the Farm and Animal details.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| variable name | name | birthYear | weight | gender |
| a1 | cow | 2012 | 1000.5 | ‘f’ |
| a2 | pig | 2009 | 550.5 | ‘m’ |
| a3 | donkey | 1999 | 773.42 | ‘m’ |
| a4 | sheep | 2016 | 164.23 | ‘f’ |
| a5 | goose | 2004 | 10.75 | ‘f’ |

**This work must be completed in your textbook**  [**ZYBooks -- CMP-326: Programming Methods I**](https://learn.zybooks.com/zybook/CUNYCMP326Fall2019/)**I**

**No other forms of submission will be accepted.**