

# CMPUT 301 2020 Winter Midterm

## TEST VERSION: Psyduck

by Abram Hindle (c) 2014-2020 all rights reserved  
[hindle1@ualberta.ca](mailto:hindle1@ualberta.ca)

Name: \_\_\_\_\_

CCID: \_\_\_\_\_

Student Number: \_\_\_\_\_

Question	Mark	Out of
Object Oriented Analysis		3
MVC		3
Code to UML		3
UML to Code		3
Cohesion and Coupling		3
<b>TOTAL</b>		15

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## TEST VERSION: Pikachu

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Name: \_\_\_\_\_

CCID: \_\_\_\_\_

Student Number: \_\_\_\_\_

Question	Mark	Out of
Object Oriented Analysis		3
MVC		3
Code to UML		3
UML to Code		3
Cohesion and Coupling		3
<b>TOTAL</b>		15

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## TEST VERSION: Jigglypuff

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Name: \_\_\_\_\_

CCID: \_\_\_\_\_

Student Number: \_\_\_\_\_

Question	Mark	Out of
Object Oriented Analysis		3
MVC		3
Code to UML		3
UML to Code		3
Cohesion and Coupling		3
<b>TOTAL</b>		15

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## TEST VERSION: Snorlax

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Name: \_\_\_\_\_

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Student Number: \_\_\_\_\_

Question	Mark	Out of
Object Oriented Analysis		3
MVC		3
Code to UML		3
UML to Code		3
Cohesion and Coupling		3
<b>TOTAL</b>		15

# CMPUT 301 2020 Winter Midterm

## TEST VERSION: Omanyte

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Name: \_\_\_\_\_

CCID: \_\_\_\_\_

Student Number: \_\_\_\_\_

Question	Mark	Out of
Object Oriented Analysis		3
MVC		3
Code to UML		3
UML to Code		3
Cohesion and Coupling		3
<b>TOTAL</b>		15

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## TEST VERSION: Mr. Mime

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Name: \_\_\_\_\_

CCID: \_\_\_\_\_

Student Number: \_\_\_\_\_

Question	Mark	Out of
Object Oriented Analysis		3
MVC		3
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UML to Code		3
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<b>TOTAL</b>		15

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CCID: \_\_\_\_\_

Object Oriented Analysis: Classes and Methods [3 marks]

Engage in **Object Oriented Analysis** and read the following scenario paragraph and pull out potential *nouns* that may lead to classes and *verbs* may lead to *methods* or *relationships*. **Draw a well-designed UML class diagram** to represent this information. Provide the basic abstractions, attributes, methods, relationships, multiplicities, and navigabilities as appropriate.

I want a fake heart ECG signal generator this will allow me to teach students what different kinds of ECG signals look like. This generator will produce ECG signals of normal hearts, hearts under stress, unhealthy hearts, and failing hearts. The ECG signals are microvolts over time sampled at 200 microvolt measurements per second. I will choose the type of heart, and the ranges of heart rate, and blood pressure, and how many signals I want generated. Then the system will generate fake ECG signals and save them to a database.

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MVC [3 marks]

**Write** the Java code for the View ScorePrinter using Active MVC. ScorePrinter prints the Model's score to the stdout (the console) when the model changes. ScorePrinter is a View. Ellipses (...) indicate there is more code that you can assume is there but you can ignore it. Our Model has a method `getScore`:

```
public class Model {  
    private Collection<View> views;  
    public int getScore() { ... }  
    public void notifyAll() { ... }  
    ...  
}
```

Our View interface is:

```
public interface View {  
    public void update(Model m);  
}
```

**Write** the Java code for the `notifyAll` method in the Model class to notify Views.



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Code to UML: [3 marks]

Convert this code to the best UML class diagram you can come up with. **Draw a well-designed UML class diagram** to represent this information. Provide the basic abstractions, attributes, methods, relationships, multiplicities, and navigabilities as appropriate. Ellipses (...) indicate there is more code that you can assume is there but you can ignore it.

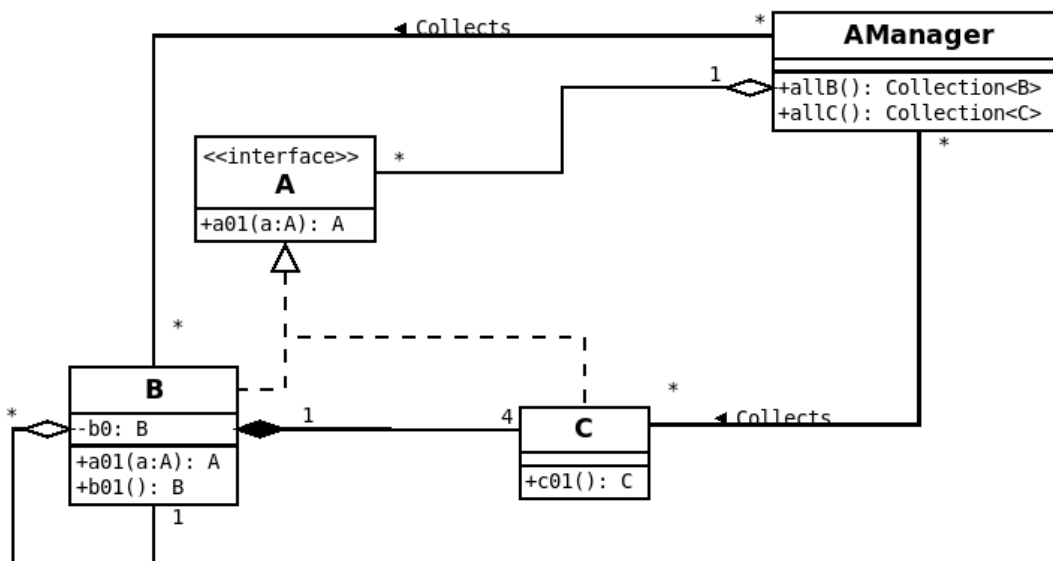
```
class DuckWinganator {
    Collection<Wing> everyDuckWing();
    private Collection<Duck> ducks;
    ...
}
class Duck {
    private Wing leftWing;
    private Wing rightWing;
    public Wing[] getWings();
    ...
}
interface Wing {
    public void flap(double power);
}
class DuckWing implements Wing {
    public void flap(double power);
    ...
}
class DarkDuckWing extends DuckWing {
    ...
}
```

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UML to Code: [3 marks]

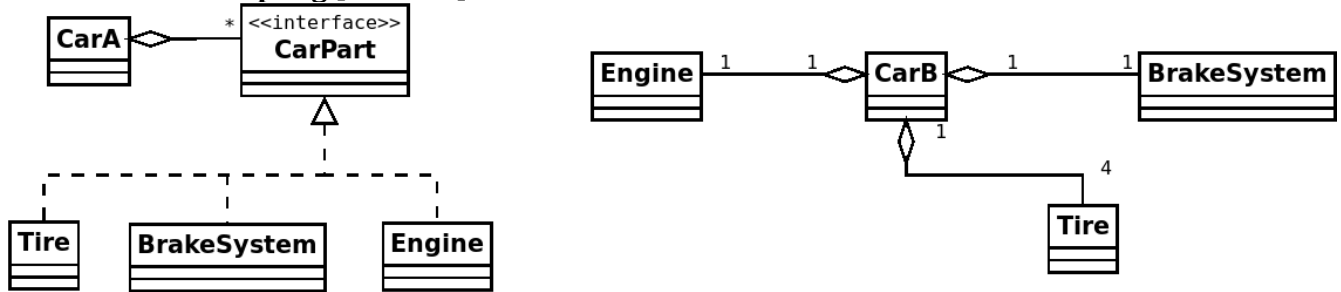
Convert this class diagram of an obfuscated program to skeletal Java Code. Include all attributes and obviously public methods. Make sure all required methods are implemented. Include all generalizations and necessary associations. If you need space feel free to use the back of the page. You may use ellipses (...) to indicate there is some code in the method but it's a midterm and who has time to write that code!



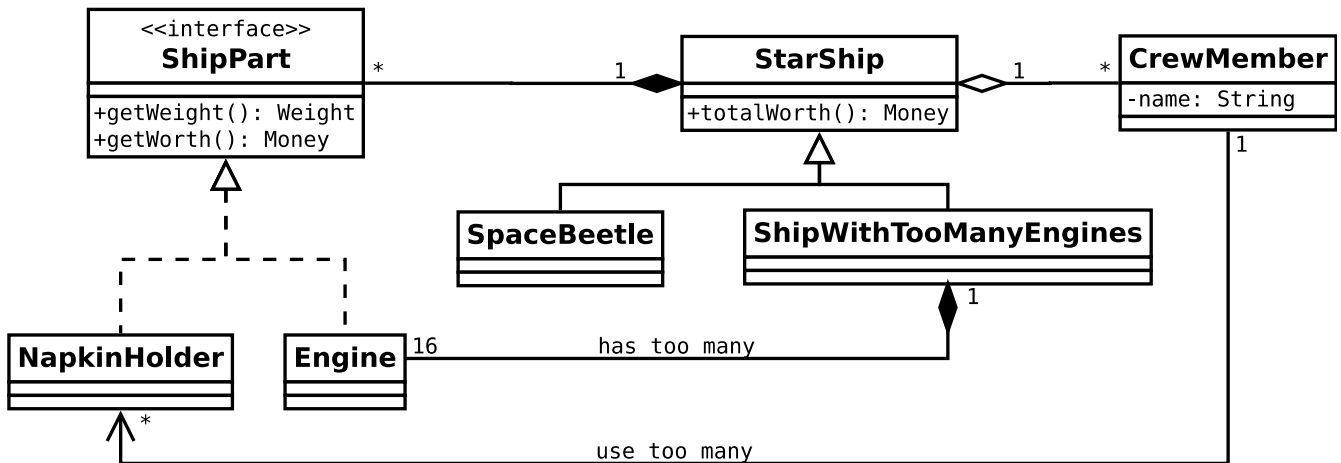
Name: \_\_\_\_\_

CCID: \_\_\_\_\_

**Cohesion and Coupling [3 marks]**



Given the above classes CarA and CarB, which one has the **least coupling**:



Given the above classes, which class has the **most coupling**:

In Active MVC we can have Views that are also controllers. Explain the difference in cohesion between a View and a View Controllers, and why.