Homework 6

There is code in the Itslearning system that you need to be aware of. Remember that you must explain your solutions if asked.

1. (total 7 points) Check the example concerning inheritance which was fully introduced during the lectures.

   (a) Test the example as it is. (0 points)

   (b) Invent and add a new intance variable for some new feature so that it will exist at least in three classes. You can make it happen by using inheritance or direct definitions. (1 points)

   (c) Change all classes so that you apply proper encapsulation everywhere. You need to add encapsulation for instance variables. (1 points)

   (d) Write at least three tests for each new change in your classes. (1 points)

   (e) Now, write a class for dog which will be the subclass for `Wolf`. Implement its barking so that dynamic binding will be applied when a dog does what it does. Also add some other methods. Encapsulate. (2 points)

   (f) Write multiple tests for your `Dog`-class and its features. (1 points)

   (g) Add needed preconditions using assert into classes `Animal, Mammal, Wolf,` and `Dog`. There are multiple examples in the codes of lectures that may help you. (1 points)

2. (3 points) Tool is an object that can be used pretty much in the same way as Character is able to utilize Items. There are different types of drills. One of them is a cordless drill. A drill bit can be attached to a cordless drill if its diameter is less than 10 mm. However, the larger (than 10 mm) drill bits can be attached into some other types of drills. There can be also different drilling tools which can be attached into cordless drill. You can find more facts concerning tools if you visit the websites of the stores where they sell for example cordless drills. Note, that these tools have multiple other features, too. For example, manufacturer, model and *rounds per minute (RPM)* value. Also the drilling tools that can be attached may have maximum rounds per minute value which must not be exceeded.

   Try to implement a class hierarchy that can solve the problem utilizing the proper object-oriented mechanisms. Study the context and iterate your solution. Be creative! Try to model the real world with your code. Implement preconditions and think how to manage the situation where the diameter of a drill bit has an upper bound. How to implement the condition of RPM levels and in which classes? What kind of modifying methods and methods for access are needed in classes? Remember the encapsulation. Use redefining the methods if it suits into your solution. Follow the 11 principles that are given in lecture slides. The principles form the core of any good solution.