**Design Rationale for requirement 3: Enemies**

All changes made to the existing UML diagrams to get the submitted UML diagrams are highlighted and justified in this document. Each class has its own behaviours and serves different purposes. This implements Single Responsibility Principle (SRP). The pros are the code is simpler and shorter and the program is easier to maintain. However, repetition of code may occur, and this violates DRY principle.

In the assignment, we are inheriting attributes and methods from abstract class. By extending an abstract class, DRY principle is implemented. This means codes can be reused and can be shared between classes that have common traits. As a result, codes do not need to be re-written, resulting in a simpler and shorter codebase.

* An abstract Enemy class was created to encapsulate all types of enemies. Different relationships are implemented to fit the class Enemy in the system  
    
  **Justifications:**
  + The abstract class Enemy was created as all types of enemies have similar behaviours and could potentially share methods. An abstract class would allow this and would prevent the developer from having to create the same methods multiple times.
  + The class Enemy is linked to the enum class Status to provide a status whether the enemy is alive or dead. The relationship is a dependency as enemy does not have an instance of Status as one of its attributes. By using enum, the code implements DRY principle. Since enum constants are final and static by default, they can be reused for every class. This helps us to reduce the workload of creating the same constants in every class that needs it.
  + Enemy class is linked to the abstract class Item via a dependency as the enemy instance’s action changes depending on the items in the actor’s inventory
  + Enemy class is linked to the interface weapon as Koopa instance need to know if it can be killed based on whether the actor (Mario) possess a weapon (a wrench)
* A new class Koopa was created, and several types of relationships are implemented for this class. (Includes changes made to abstract class Tree)  
    
  **Justifications:**
  + This class was created to represent the other type of enemy called ‘Koopa.’ It shares similar methods and attributes to that of existing enemy type Goomba.
  + The class Koopa is also linked to the abstract Class ‘Actor’ as it is part of the game as an actor.
  + The class Koopa is linked to the interface Behaviour as it could potentially implement similar behaviour as other actors. By implementing an interface, related methods and attributes can be grouped together. An interface will ensure the child class implements these methods and attributes by overriding them. This would avoid careless mistakes like forgetting to write an important method for a certain class.
  + The abstract class Tree has a dependency to the class Koopa because it has a chance to create an instance of Koopa based on a specified probability and condition.
* The class Goomba has been modified to have additional relationships  
    
  **Justification:** 
  + The abstract class Tree has a dependency to the class Goomba because it has a chance to create an instance of Goomba based on a specified probability and condition.
* Application Class now has a dependency on the abstract Enemy class instead of having individual dependency on each type of enemies.