# Answers and Solutions

## Complete UML Diagram

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## Programming Theory Questions (Suggested Answers)

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| Q | Marking Guidance | Marks |
| 1 | Sim = Simulation(LandscapeSize, InitialWarrenCount, InitialFoxCount, Variability, FixedInitialLocations)  self.\_\_Landscape[1][1].Warren = Warren(self.\_\_Variability, 38)  self.\_\_Landscape[2][10].Fox = Fox(self.\_\_Variability)  self.\_\_Rabbits[r] = Rabbit(self.\_\_Variability) | 1 |
| 2a | Landscape / LandscapeRow / Rabbits | 1 |
| 2b | Fox/Rabbit | 1 |
| 2c | Animal | 1 |
| 2d | DEFAULT\_PROBABILITY\_DEATH\_OTHER\_CAUSES  REPRODUCTION\_PROBABILITY  DEFAULT\_PROBABILITY\_DEATH\_OTHER\_CAUSES | 1 |
| 2e | Animal.\_ID | 1 |
| 2f | Any procedures with Get at the start of the identifier | 1 |
| 2g | Any procedures with Set at the start of the identifier | 1 |
| 2h | TimePeriod / WarrenCount / FoxCount / NewFoxCount / PeriodsRun / RabbitCount | 1 |
| 3a | Location to Fox or Location to Warren or Warren to Rabbit (any correct pair for both marks) | 2 |
| 3b | Rabbits objects cannot exist unless they have an associated Warren | 1 |
| 4 | Yes – the Animal class’s Inspect method is overridden in each of its subclasses (Rabbit & Fox) | 1 |
| 5 | Inspect | 1 |
| 6 | To keep selecting a different rabbit at random until the required number of rabbits have been eaten | 1 |
| 7 | Makes the program code easier to understand / improves readability  Makes it easier to update the program  Makes it easier to change the maximum number of rabbits in a warren  ANY 2 UP TO A MAX OF 2 | 2 |
| 8 | Gender | 1 |
| 9 | The DEFAULT\_LIFE\_SPAN needs to be increased from 7 | 1 |
| 10 | It stores whether or not the warren has already created a new warren  It stops the warren creating more than 1 new warren  It is set to False by default  It is set to True when a new warren is created | 4 |
| 11 | When rabbits are eaten or die they are removed from random positions in the rabbits list  Compressing rabbits list removes the gaps | 2 |
| 12 | Only female rabbits can reproduce  This therefore affects the calculation for how many new baby rabbits are born | 2 |
| 13 | Type and direction or arrow wrong  Warren does not inherit from location  Location is associated to Warren  Location stores warrens and/or foxes  Location cannot store rabbits  AlreadySpread should be set to False as default  The constant MAX\_RABBITS\_IN\_WARREN has a default value of 99  Warren should contain a list of rabbits  The inspect() procedure is missing  There is no function called ContainsFemales() in Warren  ANY 6 FOR 6 marks | 6 |

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| Q | Marking Guidance | Marks |
| 14 | |  | | --- | | Fox | | DEFAULT\_LIFE\_SPAN = 7  DEFAULT\_PROBABILITY\_DEATH\_OTHER\_CAUSES = 0.1  FoodUnitsNeeded  FoodUnitsConsumedThisPeriod = 0 | | AdvanceGeneration(ShowDetail)  ResetFoodConsumed()  ReproduceThisPeriod()  GiveFood(FoodUnits)  Inspect() |      |  | | --- | | Animal | | NaturalLifespan  ProbabilityOfDeathOtherCauses  IsAlive = True  ID  Age = 0  Animal.\_ID (class variable) | | CalculateNewAge()  CheckIfDead()  Inspect()  CheckIfKilledByOtherFactor()  CalculateRandomValue(BaseValue, Variability) |  |  | | --- | | Rabbit | | DEFAULT\_LIFE\_SPAN = 4  DEFAULT\_PROBABILITY\_DEATH\_OTHER\_CAUSES = 0.05  ReproductionRate  Gender | | Inspect()  IsFemale()  IsMale()  GetReproductionRate() |   1 mark for correct class name (×3)  1 mark for correct instance variables (×3)  1 mark for correct methods (×3)  1 mark for correct inheritance arrows (×2) | 11 |
| 15 | The number of rabbits in the warren must have reached the maximum allowed  The warren cannot have already created a new warren | 2 |
| 16 | a: TimePeriod, WarrenCount, FoxCount, MenuOption  b: ViewRabbits  c: Dist  d: ShowDetail  Or any other suitable answer  DO NOT ACCEPT CONSTANTS (THEIR IDENTIFIERS ARE MADE UP OF BLOCK CAPITALS) | 4 |
| TOTAL MARKS | | 50 |