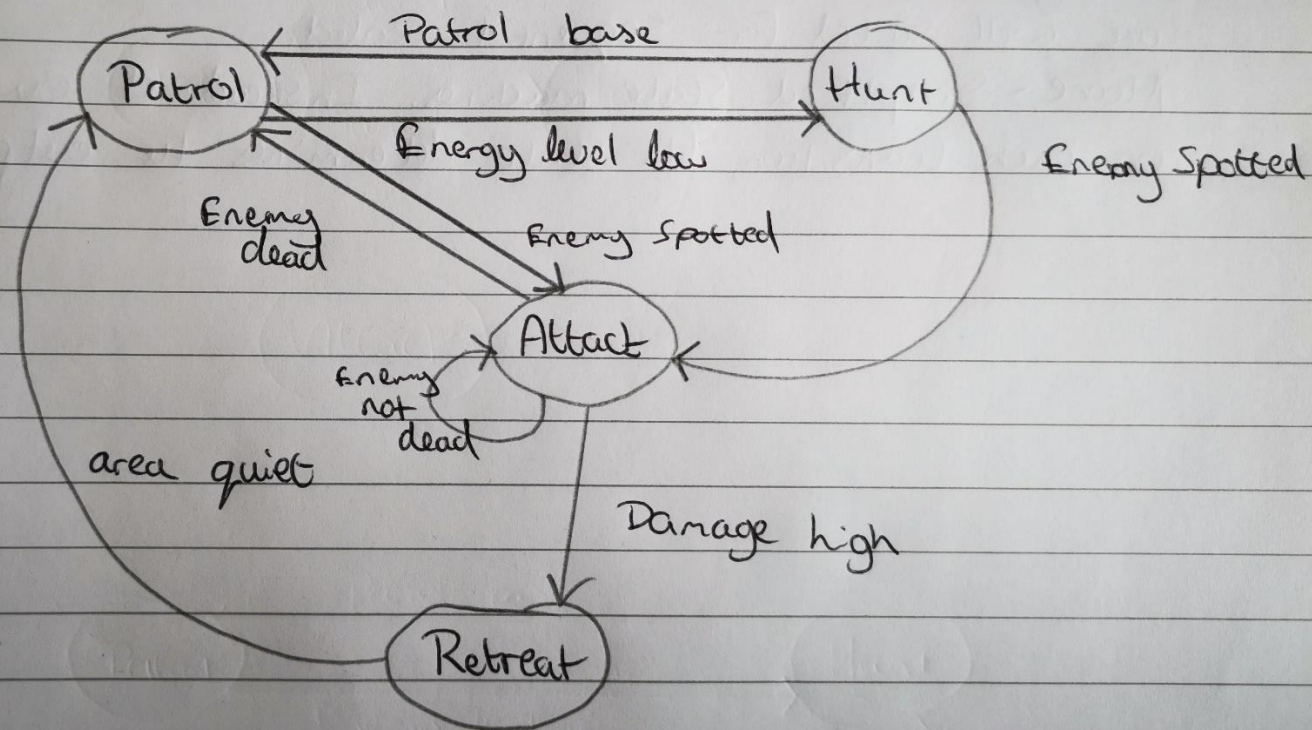


1a. i)

Q1a.

i)



1a. ii)

```
1a.ii) Attack: Enter(Shark) {  
    if (dmg(Shark) == 20) {  
        Bite(enemy);  
    }  
    else {  
        Retreat(Shark);  
    }  
}
```

```
Attack: Execute(Shark) {  
    while (dmg(Shark) >= 20 || EnemyAlive(enemy)) {  
        Bite(enemy);  
    }  
    if (dmg(Shark) < 20) {  
        Retreat(Shark); }  
    else if (!EnemyAlive(enemy)) {  
        SetPatrolMode(Shark, base); }  
    else if (dmg(Shark) <= 0) {  
        Die(Shark); } } }
```

1b)

1b. There are 2 main State machines; Mealy and Moore.
Mealy - These output data on each transition and are well suited for sequential control.

Moore - Simplified State machines. Instead of outputting on each transition, the state determines the output

3a)

3a. The denominator is usually ignored because it is the evidence, or normalising constant that makes the posterior density equal to 1.

Logarithmic values are usually faster to work with, assists with equation accuracy and simplifies further equations.

3b)

Q3 b.

$$P(\text{Your Skill} = \text{Med} | \text{Win} = Y) = 4/9$$

$$P(\text{Opp Skill} = \text{Low} | \text{Win} = Y) = 3/9$$

$$P(\text{Opp Rank} = \text{Norm} | \text{Win} = Y) = 6/9$$

$$P(\text{Your Rank} = \text{Norm} | \text{Win} = Y) = 6/9$$

$$P(\text{Win} = Y) = 9/15$$

$$P(\text{Your Skill} = \text{Med} | \text{Win} = N) = 1/6$$

$$P(\text{Opp Skill} = \text{Low} | \text{Win} = N) = 1/6$$

$$P(\text{Opp Rank} = \text{Norm} | \text{Win} = N) = 2/6$$

$$P(\text{Your Rank} = \text{Norm} | \text{Win} = N) = 2/6$$

$$P(\text{Win} = N) = 6/15$$

$$P(X | \text{Win} = Y) P(\text{Win} = Y) = \left(\frac{4}{9}\right) \times \left(\frac{3}{9}\right) \times \left(\frac{6}{9}\right) \times \left(\frac{6}{9}\right) \times \left(\frac{9}{15}\right) = 0.0395$$

$$P(X | \text{Win} = N) P(\text{Win} = N) = \left(\frac{1}{6}\right) \times \left(\frac{1}{6}\right) \times \left(\frac{2}{6}\right) \times \left(\frac{2}{6}\right) \times \left(\frac{6}{15}\right) = 0.00123$$

$$0.0395 + 0.00123 = 0.0407$$

~~$$P(X) = P(\text{Your Skill} = \text{Med}) * P(\text{Opp Skill} = \text{Low}) * P(\text{Opp Rank} = \text{Norm}) * P(\text{Your Rank} = \text{Norm})$$~~
~~$$P(X) = \left(\frac{4}{9}\right) \times \left(\frac{3}{9}\right) \times \left(\frac{6}{9}\right) \times \left(\frac{6}{9}\right)$$~~
~~$$P(X) = 0.02528$$~~

$$P(\text{Win} = \text{Yes} | X) = 0.0395 / 0.0407 = 0.970$$

$$P(\text{Win} = \text{No} | X) = 0.00123 / 0.0407 = 0.030$$

$$P(\text{Win} = \text{Yes} | X) > P(\text{Win} = \text{No} | X) = 0.97 > 0.03$$

Yes, will probably win

4a)

1a. Supervised - to observe and influence a machine learning model with data, to "teach" it with pre ~~existing~~ - existing data in the form of a labelled data set.

UnSupervised - Letting the MLM work on its own to discover information. Uses ML algorithms to draw conclusions on un-labelled data.

4b)

4 b. Classification is the process of classifying, labelling, or identifying given sets of data.

Classification is within the supervised branch of ML.

Classification is utilised with data mining and can be trained on speech and handwriting recognition.

Regression is the process of modelling a target value based upon independent predictors.

Regression is ~~ML~~ supervised ML.

Regression is used to find the relationship between variables.

4c)

4c. The Synaptic weights refer to the influence that one neuron has on other neurons, and how much the output will be influenced.

$$Wk1 = \text{input} + (\text{input} \times 0.4)$$
$$Wk2 = \text{input} + (\text{input} \times -0.2)$$
$$Wk3 = \text{input} + (\text{input} \times 0.12)$$

4d)

Not attempted