Question 1:

a. The VC dimension is the measure of complexity of an AI model (observed in Binary Classification models as discussed in class). The dimension can be observed when an attempt is made to classify all the positives and the negatives perfectly.
   Example: Assuming that we take 3 points, we can perfectly classify every possible combination of false and negatives by using.
b. No, the VC Dimension of a triangle can never be 8. This is because any triangle that is taken as our hypothesis for our 8 point graph will always have one extra point in the triangle. This means that the VC Dimension of a triangle is always 7.
c. This statement is accurate because the number of ways we can represent N would be 2^n for 2 assignments for n values. This means that the number of ways we can distinguish between two classes would be at least 2^D (Dimension). Therefore $N \leq 2^D$.

Question 2:

Error calculated by the formula (Approximate) = 20.75
Mean Squared Root error is around 4.55 which yields a score between 45-89. In terms of the error, this model performs significantly well and can produce dependable results.

If the model results in getting the same rate of error across other datasets, we can conclude that it lacks the capability to predict the data. This means that we know that the predicted output would be marginally and relatively close to the actual output. Nevertheless, we cannot ignore the fact that the root mean squared error is marginally larger if we desire an output that exactly matches the correct value.

Question 3:

a. The rationale behind splitting our data sets into 3 parts is to systematically approach how an AI model works and to check its performance.
   i. Training Set: This is the core data that the AI model is fed to learn and formulate patterns and similarities to make valid predictions.
   ii. Validation Set: We can check the performance of the AI model and assess any biases or memorization of data that might have been picked up after learning from the Training set.
   iii. Testing Set: After identifying and fixing any biases or memorization that were caught, we can now assess the model by finding the rate of error and fine tune our model until it yields results that are acceptable. The Training set is always unseen data
b. The decision of using Training data as Both Validation and Testing data is not a good one. This is because if we use the same data, we cannot see how the model performs against new and unseen data which is often extremely risky. As discussed above, we also will not be able to tell if our model is making an actual prediction or if it is just spewing an output

that is memorized. We also cannot fully come to a conclusion on the error margins which is extremely dangerous before deploying a model into the field