Questions and Answers Quiz Assessment

1. Give examples of linear, polynomial and exponential models of an outcome (Y) in terms of some observed input (X).
   - Y = 3X + 5 – Linear
   - $Y = 2X^2 + 3X - 3$
   - $Y = 2e^{-2x}$

2. What is a graph?
   - A graph is an ordered pair G = (V, E) comprising a set V of vertices or nodes or points together with a set E of edges or arcs or lines, which are 2-element subsets of V (i.e. an edge is associated with two vertices, and that association takes the form of the unordered pair comprising those two vertices)

3. Suppose we draw 2 balls randomly, one at a time without replacement, from an urn containing 4 black and 3 white balls, otherwise identical. What is the probability that the second ball is black
   - 4/7

4. What is a test-statistic?
   - A test statistic is used in a hypothesis test when you are deciding to support or reject the null hypothesis.

5. What is a p-value?
   - The **p**-value is the level of marginal significance within a **statistical** hypothesis test representing the probability of the occurrence of a given event

6. How to interpret a confidence interval of a parameter estimate?
   - If repeated samples were taken and the **95% confidence interval** was computed for each sample, **95%** of the **intervals** would contain the population mean

7. Explain why the computational complexity of the Bubble Sort algorithm is O(n2). This algorithm works by comparing each number in the list with the item next to it, and swaps them if needed to reorder the data from the smallest to the largest element
   - The inner loop does O(n) work on each iteration, and the outer loop runs for O(n) iterations, so the total work is $O(n^2)$

8. List 2 examples of programming syntax for sorting an array in different languages;
   - In R, sort()
   - In python, array.sort()
   - In java, **int[] array_raw = {2,3,4,1,5,2,6}; array_sorted = Arrays.sort(array_raw);**

Questions and Answers Quiz Assessment

9. What is inheritance in object oriented programming?
    - In object-oriented programming, inheritance enables new objects to take on the properties of existing objects.

10. What are binary data?
    - **Binary data** is **data** whose unit can take on only two possible states, traditionally termed 0 and +1 in accordance with the **binary** numeral system and Boolean algebra

11. ASCII
    - ASCII (American Standard Code for Information Interchange) is a term often used to mean that the **data** are stored in a human-readable manner, though it has a specific meaning with reference to the permitted characters allowed (i.e.. a-Z, A-Z, 0-9 and a few others)

12. Structured data
    - structured data refers to **information with a high degree of organization**, such that inclusion in a relational database is seamless and readily searchable by simple, straightforward search engine algorithms or other search operations

13. Unstructured data
    - Unstructured data (or unstructured information) is information that either does not have a pre-defined data model or is not organized in a pre-defined manner

14. What is JSON
    - JSON is an open-standard file format that uses human-readable text to transmit data objects consisting of attribute–value pairs and array data types (or any other serializable value).