Fast**National University of Computer and Emerging Sciences, Karachi  
Fall-2025, FAST School of Computing  
Quiz 1A**

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| **Course Code: AI2002** | **Course Name: Machine learning** |
| **Instructor Name: Ms. Sania Urooj** | **Date: 15th September, 2025** |
| **Student Roll No:** | **Section:** |
| **Total marks: 25** | **Obtained marks:** |

**Q1. Give short answer**

1. Machine learning studies the design and development of algorithms that learn from the data and improve their performance through experience. Justify the statement by giving real life example.
2. Define the terms ‘Model training’ and ‘Feature vector’?
3. Why is it called the bias–variance tradeoff?
4. Explain the concept of cross-Validation in machine learning.
5. What is the role of impurity measures in decision tree?
6. Why does increasing the dataset size often reduce variance?
7. What happens when a very small value of K is selected in nearest neighbor?
8. Below are some applications, write from which ML problem they belong to.
   1. Identify objects or entities within images
   2. Forecast crop yields for agriculture
   3. Determine the sentiment of a piece of text
9. KNN is known as instance-based learning. Why?
10. Why might a shallow tree underfit?

**Q2.**  Classify a new data point, "X," with the following features: *Use Euclidean Distance*.

Sepal length (SL): 5.9

Sepal width (SW): 3.0

Petal length (PL): 4.2

Petal width (PW): 1.5

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| **Sample** | **SL** | **SW** | **PL** | **PW** | **Class** |
| 1 | 5.1 | 3.5 | 1.4 | 0.2 | Setosa |
| 2 | 4.9 | 3.0 | 1.4 | 0.2 | Setosa |
| 3 | 5.8 | 2.6 | 4.0 | 1.2 | Versicolor |
| 4 | 6.7 | 3.0 | 5.2 | 2.3 | Virginica |
| 5 | 5.7 | 2.8 | 4.1 | 1.3 | Versicolor |
| 6 | 6.3 | 2.5 | 5.0 | 1.9 | Virginica |
| 7 | 5.5 | 2.4 | 3.7 | 1.0 | Versicolor |
| 8 | 6.4 | 3.2 | 4.5 | 1.5 | Versicolor |