Master of Science in Artificial Intelligence (AI) Program – Sample Test Questions

The admission test will be comprised of questions from following three broad categories:

1. Computational Problem Solving
2. Linear Algebra Fundamentals
3. Basics of Probability Theory

There will be total 15 multiple choice questions with 5 questions in each category. Following are some sample questions:

Computational Problem Solving:

1. What is the time complexity of a well-implemented bubble sort algorithm for sorting 'n' elements?

   a) O(n)

   b) O(n^2)

   c) O(log n)

   d) O(n log n)

2. Which data structure is suitable for implementing a LIFO (Last-In-First-Out) structure?

   a) Queue

   b) Heap

   c) Stack

   d) Linked List

3. In which scenario would you prefer to use dynamic programming over a greedy approach?

   a) When a global optimal solution can be reached by selecting a local optimal choice.

   b) When the problem can be broken down into smaller overlapping subproblems.

   c) When the problem involves sorting elements.

   d) When the problem involves searching for an element.

4. The Big-O notation for the fastest sorting algorithm known, which works in most cases, is:

   a) O(n)

   b) O(n log n)

   c) O(log n)

   d) O(1)

Foundations of Linear Algebra:

1. What is the determinant of a 2x2 matrix [[a, b], [c, d]]?

    a) ad - bc

    b) ab - cd

    c) ac - bd

    d) bd - ac

2. If the rank of a 3x3 matrix is 2, what can be said about its invertibility?

    a) It is invertible.

    b) It is not invertible.

    c) Invertibility cannot be determined from the given information.

    d) It depends on the values of the matrix elements.

3. Which of the following matrix operations is NOT commutative?

    a) Matrix addition

    b) Matrix multiplication

    c) Scalar multiplication

    d) Transposition

Introductory Probability Theory Concepts:

1. What is the sum of probabilities of all possible outcomes in a sample space?

    a) 1

    b) 0

    c) 2

    d) Depends on the number of outcomes

2. In a fair six-sided die, what is the probability of rolling an odd number?

    a) 1/6

    b) 1/2

    c) 1/3

    d) 2/3

3. If events A and B are mutually exclusive, what can be said about their intersection?

    a) $P(A \cap B) = 0$

b) $P(A \cap B) = 1$

c) $P(A \cap B) = P(A) + P(B)$

d) $P(A \cap B) = P(A) \times P(B)$