Answer 1: – An algorithm in a finite sequence of instructions to accomplish a task. In addition, all algorithms must satisfy the following criteria:

1. Input: Zero or more quantities are externally supplied.
2. Output: At least one quantity is produced.
3. Definiteness: Each instruction must be clear and unambiguous.
4. Finiteness: It must be terminates after finite number of steps.
5. Effectiveness: each instruction must be very basic and feasible.

Algorithm multiply (a[], x)
{
    $n = 15$ // size of array
    $m = 10$ // number of digits in the number that is stored in array a[]
    $c = 0$;   // it store carry
    for $i = 1$ to 10 do
    {
        $y = a[n-i] * x + c$

        $a[n-i] = y \% 10$

        $c = \lfloor y / 10 \rfloor$
    }
    while $(c \neq 0)$ do
    {
        $m = m + 1$

        $a[n-m] = c \% 10$

        $c = \lfloor c / 10 \rfloor$
    }
    // Printing the number
    for $i = m$ to 1 step -1 do
    {
        Print $a[n-i]$
    }
}

Answer 2: – Suppose S is a sample space and A is an event, then indicator random variable associated with event A is denoted by $I\{A\}$ and defined as

$$I\{A\} = \begin{cases} 1 & \text{if } A \text{ occurs} \\ 0 & \text{if } A \text{ does not occur} \end{cases}$$

$X_{12} = 1$ $X_{23} = 1$ $X_{34} = 1$ $X_{45} = 1$
$X_{13} = 1$ $X_{24} = 1$ $X_{35} = 1$
$X_{14} = 1$ $X_{25} = 1$
$X_{15} = 1$

```
          0   1   2   3   4
         (5), 2, 3, 1, 4
          0   1   2   3
         (4), 2, 3, 1, (5)
         (1), 2, 3, (4)(5)
         (1),(2)3, (4)(5)
```

PE = 5
j = 0 ✓ x 3 4
i = 2 - 4
PE = 4
j = 0 + 2 ✓
i = 1 - 3
PE = 1
j = 0
i = 1 - 2
PE = 2
j = 1
i = 2 - 2

Answer 3: – Let $X = \langle x_1, x_2, \ldots, x_m \rangle$ in a sequence, then the sequence $Z = \langle z_1, z_2, \ldots, z_k \rangle$ in sub-sequence of X if there exist strictly increasing sequence $\langle i_1, i_2, \ldots, i_k \rangle$ of indices of X such that for all $j = 1, 2, \ldots, k$ we have $x_{i_j} = z_j$.

e.g. $Z = \langle B, C, D, B \rangle$ in a sub-sequence of $X = \langle A, B, C, B, D, A, B \rangle$ have index seq $\langle 2, 3, 5, 7 \rangle$

common sub-sequence – Given two sequences X and Y, the sequence Z is common sub-sequence of X and Y if Z is sub-sequence of both X and Y.

– The problem is defined as to find longest sub-sequence of two sequences X and Y

$X_0 \in \epsilon$, $X_1 = \langle j \rangle$, $X_2 = \langle j, a \rangle$, $X_3 = \langle j, a, m \rangle$, $X_4 = \langle j, a, m, i \rangle$, $X_5 = X$