# Assignment 1

**AI1110**: Probability and Random Variables

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**12.13.4.1: Question**.State which of the following are not the probability distributions of a random variable:

A
| X | 0 | 1 | 2 |
|---|---|---|---|
| P(x) | 0.4 | 0.4 | 0.2 |

B
| X | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| P(x) | 0.1 | 0.5 | 0.2 | -0.1 | 0.3 |

C
| X | -1 | 0 | 1 |
|---|---|---|---|
| P(x) | 0.6 | 0.1 | 0.2 |

D
| X | 3 | 2 | 1 | 0 | -1 |
|---|---|---|---|---|---|
| P(x) | 0.3 | 0.2 | 0.4 | 0.1 | 0.05 |

**Solution:**

A :Answer

As we know the sum of all probabilities of a probability distribution must be one. i.e.,

$$\sum_{i=1}^{n} p_i = 1 \tag{1}$$

Hence the sum of probabilities of the given table=0.4+0.4+0.2=1

$$\sum_{i=1}^{3} p_i = 0.4 + 0.4 + 0.2 = 1 \tag{2}$$

Hence the given table is probability distributions of a random variable.

B :Answer

As we know the sum of all probabilities of a probability distribution must be one. i.e.,

$$\sum_{i=1}^{n} p_i = 1 \tag{3}$$

But P(X)=-0.1 for X=3 As probability of any observation must be positive.

Hence the given table is not probability distributions of a random variable.

C :Answer

As we know the sum of all probabilities of a probability distribution must be one. i.e.,

$$\sum_{i=1}^{3} p_i = 0.6 + 0.1 + 0.2 + 0.9 \tag{4}$$

The sum of probabilities of the given table is not equal to 1.

Hence the given table is not probability distributions of a random variable.

D :Answer

$$\sum_{i=1}^{5} p_i = 0.3 + 0.2 + 0.4 + 0.1 + 0.05 = 1.05 \tag{5}$$

The sum of probabilities of the given table is greater than 1.

Hence the given table is not the probability distributions of a random variable.