# **Probability Distributions: Basics**

1. Consider a random variable with the following probability distribution:

|  |  |
| --- | --- |
| X=r (or xi) | P(X=r) or (pi) |
| 0 | 0.1 |
| 1 | 0.2 |
| 2 | 0.3 |
| 3 | 0.3 |
| 4 | 0.1 |

Find the following

1. P(X<=2)
2. P(1<X≤3)
3. P(X>0)
4. P(X>3 | X>2)
5. E(X)
6. Var(X)
7. The joint probability distribution for demand and supply of a commodity are given as under:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Demand  Supply | 100 kg | 200 kg | 300 kg | 500 kg |
| 100 kg | 0.040379 | 0.115286 | 0.115051 | 0.0989 |
| 300 kg | 0.053722 | 0.115051 | 0.088249 | 0.028675 |
| 500 kg | 0.046231 | 0.0989 | 0.096091 | 0.103464 |

Find the following:

1. Marginal Probability Distribution of Supply
2. Marginal Probability Distribution of Demand
3. Conditional Probability Distribution of Supply given that demand is 300 kg
4. Conditional Probability Distribution of Demand given that supply is 300 kg
5. D1 and D2 are the demands for brand 1 and 2 respectively. The joint probability distribution for demands is as under:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| D2  D1 | 10 | 11 | 12 | 13 | 14 | 15 |
| 10 | 0.01 | 0.015 | 0.03 | 0.035 | 0.035 | 0.03 |
| 11 | 0.01 | 0.015 | 0.03 | 0.035 | 0.035 | 0.03 |
| 12 | 0.02 | 0.025 | 0.05 | 0.05 | 0.025 | 0.02 |
| 13 | 0.02 | 0.025 | 0.05 | 0.05 | 0.025 | 0.02 |
| 14 | 0.03 | 0.035 | 0.035 | 0.03 | 0.015 | 0.01 |
| 15 | 0.03 | 0.035 | 0.035 | 0.03 | 0.015 | 0.01 |

Find the following:

1. Marginal Probability Distribution of D1
2. Marginal Probability Distribution of D2
3. Conditional Probability Distribution of D2 given that D1 is 13 kg
4. Conditional Probability Distribution of D1 given that D2 is 12 kg