```
ClearAll[a0, p0];

(*   Comments inside (...)   *)
(* Transition matrix a0, the components of each row vector add to one *)

a0 = {{1, 0, 0, 0}, {0.2, 0.1, 0.2, 0.5}, {0, 0.4, 0.4, 0.2}, {0.4, 0.3, 0, 0.3}};
b = MatrixForm[a0]

(* Initial probabilities for each state: 0 for the absorbing state,
and equal probabilities(no preference)for the transient states *)

p0 = DiscreteMarkovProcess[{0, 1 / 3, 1 / 3, 1 / 3}, a0];

(* Drawing the associated graph with different shades for each vertex *)

Graph[p0, VertexShapeFunction → Automatic, VertexSize → 0.25,
 ImageSize → Medium, VertexStyle → {1 → Bold, 2 | 3 | 4 → White}]

(* First passage time distribution to absorbing state 1 *)

d0 = FirstPassageTimeDistribution[p0, 1];

(* Probability density function as a function of k = time *)

PDF[d0, k];
DiscretePlot[%, {k, 0, 15}, ExtentSize → 1, AxesLabel → {"k", "p(k)"},
 Epilog → {Line[{{10, 0}, {10, 0.2}}], Text[Style["T", Black], {10.5, 0.18}]}]
Mean[d0]
StandardDeviation[d0]

(* Total cumulative probability for k ≤ T *)

Sum[PDF[d0, k] , {k, 1, 10}]
```