

CSE 301: Mathematical Analysis for Computer Science  
Class Test 4 (Introduction to Probability and Random Variables)

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Name:

Student No.

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Write in the left margin "T/F" for True/False.

1. Sample space of an unfair coin tossed two times is {HH, HH, HT, TT}  
[F: For a biased coin with H and T, the sample space remains fixed, the probability of each sample may change.]
2. Expected value of the outcome of a dice having faces 1, 1, 3, 4, 5, 5 is 3 as 3 is the middle value of these face values.  
[F: 19/6]
3.  $P(E|F) = P(EF)/P(E)$   
[F:  $P(E|F) = P(EF)/P(F)$ ]
4. Three persons put hat in a bin. Then they pick a hat one by one without replacement. Then the probability of third person gets his own hat is 1/3.  
[F: 1]
5. For two event E and F,  $E = EF \cap EF^C$   
[F:  $E = EF \cup EF^C$ ]
6. A fair coin is tossed twice. Probability of at least one head is  $\frac{1}{2}$   
[F:  $\frac{3}{4}$ ]
7. If p is the probability of a head, then the probability of first head in n-th trial is  $(1-p)^n p$   
[F:  $(1-p)^{n-1} p$ ]
8. The above probability distribution is called Bernoulli distribution  
[F: Geometric distribution]
9. If p is the probability of a head, then the probability of r heads among n trials is  ${}^n C_r p^r (1-p)^{n-r}$   
[T]
10. Expected value of a Poisson random variable with parameter  $\lambda$  is  $\lambda$   
[T]

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Class Test 5 (Markov Chains)

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1. Let  $\alpha$  and  $\beta$  denote the following probabilities:

$\alpha$ : Probability of rain tomorrow given that it is raining today = 0.7

$\beta$ : Probability of rain tomorrow given that it is not raining today = 0.4

Now fill up the blanks

- i. Given that it is raining today, the probability of that it will rain tomorrow is .7
- ii. Given that it is not raining today, the probability of that it will rain tomorrow is .4
- iii. Given that it is raining today, the probability of that it will not rain tomorrow is .3
- iv. Given that it is not raining today, the probability of that it will not rain tomorrow is .6
- v. Given that it is raining today, the probability of that it will rain day after tomorrow is .61

- vi. Given that it is not raining today, the probability of that it will rain day after tomorrow is .52
- vii. Given that it is raining today, the probability of that it will not rain day after tomorrow is .39
- viii. Given that it is not raining today, the probability of that it will not rain day after tomorrow is .48
- ix. Long term probability of rain .57
- x. Long tem probability of no rain .43