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1. What are the two properties required of a Bernoulli trial? Why does the binomial coefficient come up when you try to find probability of k successes in n trials?
2. Suppose the probability that a person in a city is infected is 1 percent and consider 10 people who do not come into contact (and thus do not influence each other). In other words, the incidence of disease in each one of them is independent and random. Let $P(x)$ denote the probability that the person x is infected and $P(x')$ the probability that the person is not infected.
If A and B are two of these 10 people how do you find $P(A \text{ and } B)$ and $P(A \text{ or } B)$?
3. How about $P(A')$? How about $P((A \text{ and } B)')$? Would it equal $P(A \text{ or } B \text{ not both})$? How about $P((A \text{ or } B)')$?
4. How would you find the probability that exactly one of the ten people are infected? How would you find the probability that at least one of the ten people are infected?
5. How would you find the probability that exactly three of the ten people are infected? How would you find the probability that at most one of the ten people are infected?
6. What would be the average number of people that are expected to be infected out of any unconnected group of 1000 people? How would you calculate the average?
7. Suppose in some probability distribution the probability of n successes is $\frac{1}{n2^n \ln 2}$ if $n > 0$ and 0 if $n = 0$. How would you calculate the average number of successes ? What is the average number of successes? [Challenge: Show that the probability of any number of successes is 1]. Note that n can be any of 0, 1, 2, 3, 4,
8. Describe how Poisson distribution is derived from Binomial distribution.
9. In a call center 9 calls arrive on the average, per hour. What is the probability that exactly 2 calls arrive in 20 minutes?
10. What would be the probability of getting no calls in 20 minutes? At least one call? At most 2 calls?
11. Find the probability of waiting at most 20 minutes for the first call. What is the probability of waiting at most 20 minutes for 3 calls?