## Binomial and Poisson Random Variables

STAT-UB. 0103 - Statistics for Business Control and Regression Models

## Binomial random variables

1. A certain coin has a $25 \%$ of landing heads, and a $75 \%$ chance of landing tails.
(a) If you flip the coin 4 times, what is the chance of getting exactly 2 heads?
(b) If you flip the coin 10 times, what is the chance of getting exactly 2 heads?
2. Suppose that you are rolling a die eight times. Find the probability that the face with two spots comes up exactly twice.
3. The probability is 0.04 that a person reached on a "cold call" by a telemarketer will make a purchase. If the telemarketer calls 40 people, what is the probability that at least one sale with result?
4. A new restaurant opening in Greenwich village has a $30 \%$ chance of survival during their first year. If 16 restaurants open this year, find the probability that
(a) exactly 3 restaurants survive.
(b) fewer than 3 restaurants survive.
(c) more than 3 restaurants survive.

## Poisson random variables

5. The number of calls arriving at the Swampside Police Station follows a Poisson distribution with rate 4.6 /hour. What is the probability that exactly six calls will come between 8:00 p.m. and 9:00 p.m.?
6. In the station from Problem 5, find the probability that exactly 7 calls will come between 9:00 p.m. and 10:30 p.m.
7. Car accidents occur at a particular intersection in the city at a rate of about $2 /$ year. Estimate the probability of no accidents occurring in a 6 -month period.
8. In the intersection from Problem 7, estimate the probability of two or more accidents occurring in a year.

## Empirical rule with Binomial and Poisson random variables

9. If $X$ is a Poisson random variable with $\lambda=225$, would it be unusual to get a value of $X$ which is less than 190 ?
10. The probability is 0.10 that a person reached on a "cold call" by a telemarketer will make a purchase. If the telemarketer calls 200 people, would it be unusual for them to get 30 purchases?
