

SECTION 9.1 : BINOMIAL PROBABILITY DISTRIBUTION

A BINOMIAL probability experiment has

- a fixed number n of repeated trials
- each trial has outcomes that we can classify as “success or “failure”
- outcome of trials are independent (*Outcome of a trial does not influence outcome of future trials*)
- the probability of success on a single trial, p , is constant (the same) for all trials

We are interested in the number of successes, x , in n trials

EXAMPLE 37: A college claims that 70% of students receive financial aid. Suppose that 4 students at the college are randomly selected. We are interested in the number of students in the sample who receive financial aid.

$X =$ _____
 $p =$ the probability that a student receives financial aid: $p =$ _____ $q = 1-p =$ _____

X	P(x)	Ways to get x successes in n trials																		
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Find the probability that AT MOST 2 of the students in the sample receive financial aid:

EXAMPLE 38 : An auto insurance company estimates that 15% of its auto insurance claims involve fraud. An auditor randomly selects 12 claims out of a huge population of tens of thousands of claims to review. Show work using the binomial probability formulas.

- a. Find the probability that 2 of the 12 selected claims involve fraud.
- b. Find the probability that half of the 12 selected claims involve fraud.
- c. Find the probability that 8 of the 12 selected claims involve fraud.
- c. Find the probability that none of the 12 selected claims involve fraud.
- d. Find the probability that at least one claim involves fraud.

Formulas for Binomial Distribution: $P(X = x) = {}_n C_x p^x (1-p)^{n-x}$
 $P(X = x)$ is the probability of obtaining x successes in n independent trials

$$P(X = x) = \left(\begin{matrix} \text{Number of ways to get} \\ x \text{ successes in } n \text{ trials} \end{matrix} \right) \left(\begin{matrix} \text{probability} \\ \text{of success} \end{matrix} \right)^{\text{number of successes}} \left(\begin{matrix} \text{probability} \\ \text{of failure} \end{matrix} \right)^{\text{number of failures}}$$

ADDITIONAL PRACTICE PROBLEM FOR BINOMIAL PROBABILITY

EXAMPLE 39 :

http://www.pewresearch.org/fact-tank/2016/01/05/pew-research-center-will-call-75-cellphones-for-surveys-in-2016/?utm_source=Pew+Research+Center&utm_campaign=4a62041804-Methods_Newsletter_for_June6_24_2015

A Pew Research Center study of phone ownership cites that:

65.7% of 25- to 29-year-olds live in wireless-only households, that is, own a cell phone only and do not have landline phones.

a. Find the probability that in a sample of 10 people age 25-29, that 4 of the people in the sample have landlines.

b. Find the probability that in a sample of 10 people age 25-29, that only 1 person does not have a landline.