

Worksheet -- Binomial Distribution

1) Suppose a balloon manufacturer claims that 65% of his balloons will not burst when inflated. You have 10 of these balloons to inflate for Ms. Powell's birthday party.

- A. If 65% of the balloons will not burst, what percent of balloons will pop? $35\% = .35$
- B. Construct a probability distribution table for the balloons that will pop.

x	0	1	2	3	4	5	6	7	8	9	10
p(x)	.013	.072	.176	.252	.238	.154	.069	.021	.004	5.123×10^{-4}	2.754×10^{-5}

C. Find the probability that exactly 7 of the balloons will pop.

$$P(x=7) = \text{binompdf}(10, .35, 7) \quad .021$$

D. Find the probability that at most 4 of the balloons will pop.

$$P(x \leq 4) = \text{binomcdf}(10, .35, 4) \quad .751$$

E. Find the probability that at least 5 of the balloons will pop.

$$P(x \geq 5) = 1 - \text{binomcdf}(10, .35, 4) \quad .249$$

F. Find the probability that no more than 3 balloons pop.

$$P(x \leq 3) = \text{binomcdf}(10, .35, 3) \quad .514$$

G. What is the expected number of balloons that will pop?

$$10(.35) \quad 3.5$$

2) The Los Angeles Times (Dec. 13, 1992) reported that 80% of airline passengers prefer to sleep on long flights rather than watch movies, read, etc. Consider randomly selecting 25 passengers from a particular long flight.

A. What is the probability that exactly 12 of those selected passengers prefer sleeping?

$$P(x=12) = \text{binompdf}(25, .80, 12) \quad 2.928 \times 10^{-4} \text{ or } .00029$$

B. What is the probability that all passengers selected prefer to sleep on the long flight?

$$P(x=25) = \text{binompdf}(25, .80, 25) \quad .004$$

C. What is the probability that at least 20 passengers prefer sleeping on the long flight?

$$P(x \geq 20) = 1 - \text{binomcdf}(25, .80, 19) \quad .617$$

D. What is the average number (expected number) of passengers that prefer sleeping on the long flight?

$$25(.80) \quad 20$$

- 3) Mr. Greg often goes out to eat at a certain restaurant. He always orders from the menu randomly (because it's more fun that way). He's determined that the probability of getting something he likes is 0.87. He goes to the same restaurant every day for one week.

A. Construct a probability distribution table.

X	0	1	2	3	4	5	6	7
P	6.275×10^{-7}	2.940×10^{-5}	5.902×10^{-4}	.007	.044	.177	.395	.377

B. What is the probability of him enjoying 5 or more of his meals?

$$P(X \geq 5) = 1 - \text{binomcdf}(7, .87, 4) \quad .949$$

C. If Mr. Greg enjoys at least 6 of those meals, then he will leave a big tip at the end of the week. Find the probability that he leaves a big tip.

$$P(X \geq 6) = 1 - \text{binomcdf}(7, .87, 5) \quad .772$$

D. What is the probability that he enjoys no more than 1 of the meals, and therefore never returns to that restaurant?

$$P(X \leq 1) = \text{binomcdf}(7, .87, 1) \quad 3.002 \times 10^{-5} \text{ or } .00003002$$

E. How many meals can we expect him to enjoy over those 7 days?

$$7(.87) \quad 6.09$$