

5. According to the *Information Please Almanac*, 80% of adult smokers started smoking before turning 18 years old. Suppose 100 adult smokers are randomly selected, would it be unusual to find at most 71 who started smoking before turning 18 years old? Explain.

Is this binomial?

$\frac{\sqrt{F}}{\sqrt{I}}$
 $\frac{\sqrt{T}}{\sqrt{\text{Constant}}}$

One way of looking at the problem is to calculate the probability of 71 or fewer successes. Since that probability is less than 5% we can say it would be unusual.

$$P(X \leq 70) = \text{binomcdf}(100, .80, 71) \sim 0.020$$

Another method would be to calculate the mean and standard deviation for a binomial distribution and get an interval for the mean plus or minus two standard deviations. Since 71 is outside of the interval (72, 88) we can say it would be unusual to get 71 or fewer.

$$\mu = np \qquad \mu = (100)(.80) = 80$$

$$\sigma = \sqrt{npq} \qquad \sigma = \sqrt{(100)(.8)(.2)} = 4$$

$$\mu + 2\sigma = 88 \qquad \mu - 2\sigma = 72$$