

1. A die is weighted so that the probability of rolling a “6” is 0.48. The die is rolled 18 times.

a) Find the probability that the die lands on a “6” exactly 11 times.

Binomial probability

$$P(X=11) = \binom{18}{11} (0.48)^{11} (0.52)^7$$

$p = 0.48 \quad n = 18$

$X = \# \text{ of die rolls that land "6"}$

$$= \boxed{0.1020}$$

① Show “work”

② Use “BinomPDF(18, 0.48, 11)”

b) Find the probability that the die lands on a “6” either 7 or 8 times.

$$P(X=7 \text{ or } 8) = P(X=7) + P(X=8)$$

$$= \binom{18}{7} (0.48)^7 (0.52)^{11} + \binom{18}{8} (0.48)^8 (0.52)^{10}$$

$$= 0.14044 + 0.17825 = \boxed{0.3187}$$

c) Find the probability that the die lands on a “6” no more than 5 times (this means 5 times or fewer).

$$P(X \leq 5) = P(X=0) + P(X=1) + P(X=2) + \dots + P(X=5)$$

$$= \binom{18}{0} (0.48)^0 (0.52)^{18} + \binom{18}{1} (0.48)^1 (0.52)^{17} + \dots + \binom{18}{5} (0.48)^5 (0.52)^{13}$$

$$= \boxed{0.0676}$$

Again... ① Show “work”

② Use “BinomCDF(18, 0.48, 5)”

d) Find the probability that the die lands on a “6” at least 4 times.

$$P(X \geq 4) = P(X=4) + P(X=5) + \dots + P(X=18) \leftarrow \text{UGH!!!}$$

$$= 1 - [P(X \leq 3)]$$

$$= 1 - \left[ \binom{18}{0} (0.48)^0 (0.52)^{18} + \dots + \binom{18}{3} (0.48)^3 (0.52)^{15} \right]$$

$$= 1 - [0.0061] = \boxed{0.9939}$$

BinomCDF(18, 0.48, 3)

e) In statistics, an event is considered “**UNLIKELY**” if the probability of it occurring is less than five percent. Based on your answer to part (C), is landing a “6” on this die for no more than 5 tosses considered an **UNLIKELY** event? Explain.

The probability of 5 or fewer sixes is 0.0676.

This is greater than 5%, so this is NOT considered statistically unlikely.  
(barely)

2. A die is weighted so that the probability of rolling a "6" is 0.42. The die is rolled 18 times.
- Find the probability that the die lands on a "6" exactly 11 times.
  - Find the probability that the die lands on a "6" either 7 or 8 times.
  - Find the probability that the die lands on a "6" no more than 5 times (*this means 5 times or fewer*).
  - Find the probability that the die lands on a "6" at least 4 times.
  - In statistics, an event is considered "**UNLIKELY**" if the probability of it occurring is less than five percent. Based on your answer to part (C), is landing a "6" on this die for no more than 5 tosses considered an **UNLIKELY** event? Explain.