

# Extra Questions

2) Mail-order marketing companies have a response rate of 15% to their advertising flyers.

a) Compute the probability that exactly 3 people out of a sample of 20 respond to the flyers they receive.

$$P(X = 3) = \binom{20}{3} (0.15)^3 (0.85)^{17} = 0.243 \quad \text{desmos} \quad n = 20$$

OR

$$\text{binomialdist}(20, 0.15) \quad p = 0.15$$

$$P(X = 3) = \text{binompdf}(n = 20, p = 0.15, k = 3) = 0.243 \quad k = 3$$

b) Find the expected number of people in a sample of 20 who will respond to the flyers.

$$E(x) = np = 20(0.15) = 3$$

c) Compute the probability that at least 3 people out of a sample of 20 respond to the flyers they receive.

$$\begin{aligned} P(X \geq 3) &= 1 - P(X \leq 2) \\ &= 1 - \text{binomcdf}(n = 20, p = 0.15, k = 2) \quad \checkmark \text{ min } 3 \text{ max } 20 \\ &= 1 - 0.4049 \\ &= 0.5951 \end{aligned}$$

5) Ten percent of the keyboards a computer company manufactures are defective. Determine the probability that one or more of the next three keyboards to come off the assembly line will be defective.

$$\begin{aligned}P(X \geq 1) &= 1 - P(0) \\&= 1 - \text{binompdf}(n = 3, p = 0.1, k = 0) \\&= 1 - 0.729 \\&= 0.271\end{aligned}$$

desmos  
binomialdist(3, 0.10)  
✓ min 1 max 3

7) A multiple-choice quiz has 10 questions. Each question has four possible answers. Sam is certain that he knows the correct answer for Questions, 3, 5, and 8. If he guesses on the other questions, determine the probability that he gets at least 50% on the quiz.

*To get at least 50%, Sam will need to guess at least 2 of the remaining seven questions correctly.*

$$P(X \geq 2) = 1 - P(X \leq 1) = 1 - \text{binomcdf}(n = 7, p = 0.25, k = 1) = 1 - 0.4449 = 0.5551$$

desmos  
binomialdist(7, 0.25)  
✓ min 2 max 7

8) A survey indicates that 41% of women in the United States consider reading as their favorite leisure-time activity. You randomly select four U.S. women and ask them if reading is their favorite leisure-time activity.

a) Create a binomial probability distribution for the number of women who respond yes.

# of women whose favorite leisure activity is reading (X)	P(X)
0	$\binom{4}{0}(0.41)^0(0.59)^4 = 0.121$ $\text{binompdf}(n = 4, p = 0.41, k = 0) = 0.121$
1	$\binom{4}{1}(0.41)^1(0.59)^3 = 0.337$ $\text{binompdf}(n = 4, p = 0.41, k = 1) = 0.337$
2	$\binom{4}{2}(0.41)^2(0.59)^2 = 0.351$ $\text{binompdf}(n = 4, p = 0.41, k = 2) = 0.351$
3	$\binom{4}{3}(0.41)^3(0.59)^1 = 0.163$ $\text{binompdf}(n = 4, p = 0.41, k = 3) = 0.163$
4	$\binom{4}{4}(0.41)^4(0.59)^0 = 0.028$ $\text{binompdf}(n = 4, p = 0.41, k = 4) = 0.028$

b) What is the probability that at least two of them respond yes?

$$P(\geq 2) = P(2) + P(3) + P(4) = 0.351 + 0.163 + 0.028 = 0.542$$

desmos  
binomialdist(4, 0.41)

✓ min 2 max 4

c) What is the expected number of women in the group of 4 that would choose reading as their favourite leisure time activity?

$$E(x) = np = 4(0.41) = 1.64$$