

5 four-sided dice $X = \text{count } 1\text{'s}$

$$X \sim B(5, \frac{1}{4}) \quad E(X) = \frac{1}{4}(5) = \frac{5}{4}$$

X	0	1	2	3	4	5
P(X)	$\frac{243}{1024}$	$\frac{405}{1024}$	$\frac{270}{1024}$	$\frac{90}{1024}$	$\frac{15}{1024}$	$\frac{1}{1024}$

$$P(X=0) = \binom{5}{0} \left(\frac{1}{4}\right)^0 \left(\frac{3}{4}\right)^5 = \frac{243}{1024}$$

$$P(X=1) = \binom{5}{1} \left(\frac{1}{4}\right)^1 \left(\frac{3}{4}\right)^4 = \frac{405}{1024}$$

$$P(X=2) = \binom{5}{2} \left(\frac{1}{4}\right)^2 \left(\frac{3}{4}\right)^3 = \frac{270}{1024}$$

$$P(X=3) = \binom{5}{3} \left(\frac{1}{4}\right)^3 \left(\frac{3}{4}\right)^2 = \frac{90}{1024}$$

$$P(X=4) = \binom{5}{4} \left(\frac{1}{4}\right)^4 \left(\frac{3}{4}\right)^1 = \frac{15}{1024}$$

$$P(X=5) = \binom{5}{5} \left(\frac{1}{4}\right)^5 \left(\frac{3}{4}\right)^0 = \frac{1}{1024}$$

15C #3 (a) binomial pdf (8, 2/7, 5)

(b) binomial cdf (8, 2/7, 4)

(c) ~~or~~ 1 - binomial cdf (8, 2/7, 5)

(d) 1 - binomial pdf (8, 2/7, 0)

15D #5. $X =$ number of nights @ 7:30 out of 5

$$P(X \leq 3) = \text{binomial cdf}(5, 0.4, 3)$$

#6. $X =$ number of waffles out of 6

$$\begin{aligned} \text{(a)} \quad P(X > 1) &= 1 - P(X \leq 1) \\ &= 1 - \text{binomial cdf}(6, 0.15, 1) \end{aligned}$$

$$\text{(b)} \quad P(X = 1) = \text{binomial pdf}(6, 0.15, 1)$$

$$\text{Ex. } (3x + y^2)^4$$

$$= \binom{4}{4} (3x)^4 (y^2)^0 + \binom{4}{3} (3x)^3 (y^2)^1 + \binom{4}{2} (3x)^2 (y^2)^2 + \binom{4}{1} (3x)^1 (y^2)^3 + \binom{4}{0} (3x)^0 (y^2)^4$$

$$= 81x^4 + 108x^3y^2 + 54x^2y^4 + 12xy^6 + y^8$$

$$\binom{4}{2} = \frac{4!}{2!(4-2)!} = \frac{4 \cdot 3 \cdot 2}{2 \cdot 2} = 6$$

$$\binom{n}{r} = \frac{n!}{r!(n-r)!}$$

$$(4x - 5)^3$$

$$= (4x)^3 + \binom{3}{2} (4x)^2 (-5)^1 + \binom{3}{1} (4x) (-5)^2 + (-5)^3$$

$$= \underline{\underline{64x^3 - 240x^2 + 300x - 125}}$$