Week in Review #5

1. (a) This part is not a binomial problem since which trials are success and which are failures are specified. Use a tree to get this answer.
\[\left(\frac{2}{5}\right)^3 \times \left(\frac{3}{5}\right)^2\]
(b) \(n=5, p=\frac{2}{5}, r=4\)
\[\text{binompdf}(5,0.4,4) = 0.0768\]
(c) \(n=5, p=\frac{2}{5}, r=2, 3, 4\)
\[\text{binompdf}(5,0.4,2) + \text{binompdf}(5,0.4,3) + \text{binompdf}(5,0.4,4)\]
\[\text{or} \ \text{binomcdf}(5,0.4,4) - \text{binomcdf}(5,0.4,1)\]
Answer: 0.6528

2. note: \(p = \text{probability of success}\). convert the number of failures to the number of success. one failure means 4 success; 2 failures means 3 success; ....
\(n=5, p=\frac{3}{7}, r=0, 1, 2, 3, 4\)
\[\text{binomcdf}(5,\frac{3}{7},4)\]
Answer: 0.9855

3. (a) \(n=25, p=\frac{1}{6}, r=0, 1, 2, 3, 4\)
\[\text{binomcdf}(25,\frac{1}{6},4)\]
Answer: 0.5937
(b) \(n=25, p=\frac{2}{7}, r=7, 8, 9,...,25\)
\[\text{binomcdf}(25,\frac{2}{7},25) - \text{binomcdf}(25,\frac{2}{7},6)\]
Answer: 0.7785
(c) Since the first three rolls are multiples of three, this means the number of trials is actually 22 and we need at least 4 of the remaining 22 rolls to be a multiple of three.
\(n=22, p=\frac{2}{7}, r=4, 5, 6,...,22\)
\[1 - \text{binomcdf}(22,\frac{2}{7},3)\]
Answer: 0.9649

4. (a) \(n=80, p=0.15, r=5, 6, 7, 8, 9, 10, 11, 12\)
\[\text{binomcdf}(80,0.15,12) - \text{binomcdf}(80,0.15,4)\]
Answer: 0.57148
(b) \(n=70\) (since we know the results of the first 10 people)
\(p=0.015\)
since 5 people of the first 10 had a reaction, we only need 12 more people to get a total of 17.
\(r=12\)
\[\text{binomcdf}(70,0.15,12)\]
Answer: 0.1112

5. not binomial.
\[\frac{C(15,6)C(55,4)}{C(70,15)}\]

6. \(n=7, p=\frac{1}{12}, r = 2, 3, 4, 5, 6,7\)
Answer: \(1 - \text{binomcdf}(7,\frac{1}{12}, 1) = 0.1101\)

7. (a) infinite discrete.
values: \(X = 1, 2, 3, ....\)
(b) finite discrete.
values: \(X = 0, 1, 2, 3, ..., 12\)
(c) continuous.
values: \(\text{room temp} \leq x \leq \text{temp of the heating element}\)
(d) continuous.
values: \(0 \leq X \leq \text{length of class time. either 50 min or 75 min}\)

8. (a) \(x = 2, 3, 4, 5\)
(b) prob dist.(given in two parts)
\[\begin{array}{ccc}
  \text{x} & 2 & 3 \\
  \text{prob} & \frac{C(5,2)C(4,4)}{C(9,6)} & \frac{C(5,3)C(4,3)}{C(9,6)}
\end{array}\]
\[\begin{array}{ccc}
  \text{x} & 4 & 5 \\
  \text{prob} & \frac{C(5,4)C(4,2)}{C(9,6)} & \frac{C(5,5)C(4,1)}{C(9,6)}
\end{array}\]
\[\text{or}\]
\[\begin{array}{cccc}
  \text{x} & 2 & 3 & 4 & 5 \\
  \text{prob} & 10\text{st} & 40\text{st} & 30\text{st} & 4\text{th}
\end{array}\]

(c) Histogram

(d) \(\frac{30}{84}\)
(e) \(\frac{10+40}{84} = \frac{50}{84}\)

9. Histogram
10. draw the tree to make this problem easier

\[
\begin{array}{c|c|c|c|c|c|c}
\text{x} & -2 & -1 & 0 & 1 & 2 & 3 & 4 \\
\hline
\text{prob} & \frac{3}{15} & \frac{2}{15} & \frac{1}{15} & \frac{2}{15} & \frac{1}{15} & \frac{2}{15} & \frac{1}{15} \\
\end{array}
\]

11. \(E(X) = 2 \cdot \frac{10}{15} + 3 \cdot \frac{10}{15} + 4 \cdot \frac{30}{15} + 5 \cdot \frac{4}{15}\)

\[E(x) = 3.3333\]

Note: since Expected value is an average, don’t round to the nearest integer.

12. \(E(x) = -0.5\)

13. Let \(X\) be the net winnings and let \(A\) be the cost of the game.

\[
\begin{array}{c|c|c|c|c|c}
\text{X} & 12-A & 5-A & 2-A & 0 & -A \\
\hline
\text{prob.} & \frac{1}{5} & \frac{1}{5} & \frac{2}{5} & \frac{1}{5} & \frac{2}{5} \\
\end{array}
\]

Want \(E(X) = 0\). Solve this equation for \(A\).

Answer: \(A = $3\)

14. mean = 14.625
median = 14.5
mode: 12 and 16

15. Type the values of \(X\) into \(L_1\), the frequency into \(L_2\), and then compute

1-Var Stats \(L_1, L_2\)

mode: 10
mean = 17.3571
median = 12

16. Find a number to represent each interval. I’ll use the middle value of the interval.

\[
\begin{array}{c|c|c|c|c}
\text{data} & 4.5 & 12.5 & 20.5 & 28.5 \\
\text{frequency} & 8 & 10 & 15 & 20 \\
\end{array}
\]

estimated mean = 19.5943