

Week 4 Questions

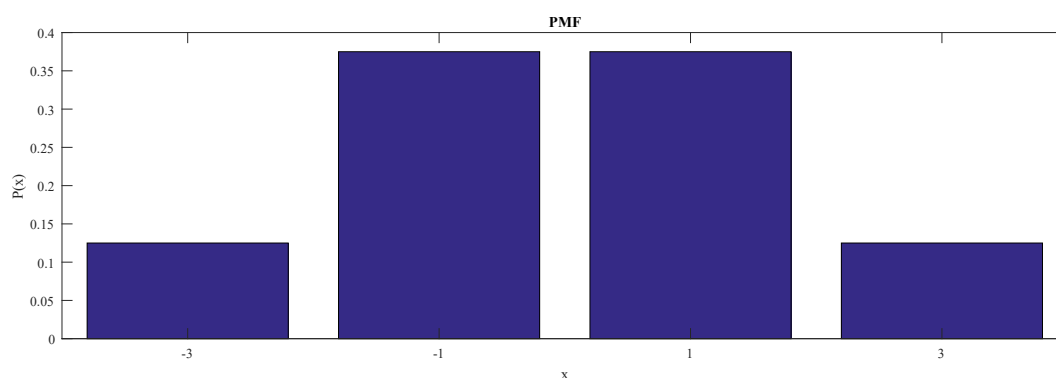
Q1

- a) If $Y = 2$, that means the sum of the dice is 2, which is only true for one outcome $\rightarrow \{(1,1)\}$
- b) Similarly for $Y = 3$, $\{(1,2), (2,1)\}$
- c) For $Y = 4$, $\{(1,3), (2,2), (3,1)\}$
- d) There are 3 possible outcomes where $X = 1$, out of a total of 6^2 possibilities, which gives us $\frac{3}{36} = 0.083$

Q2

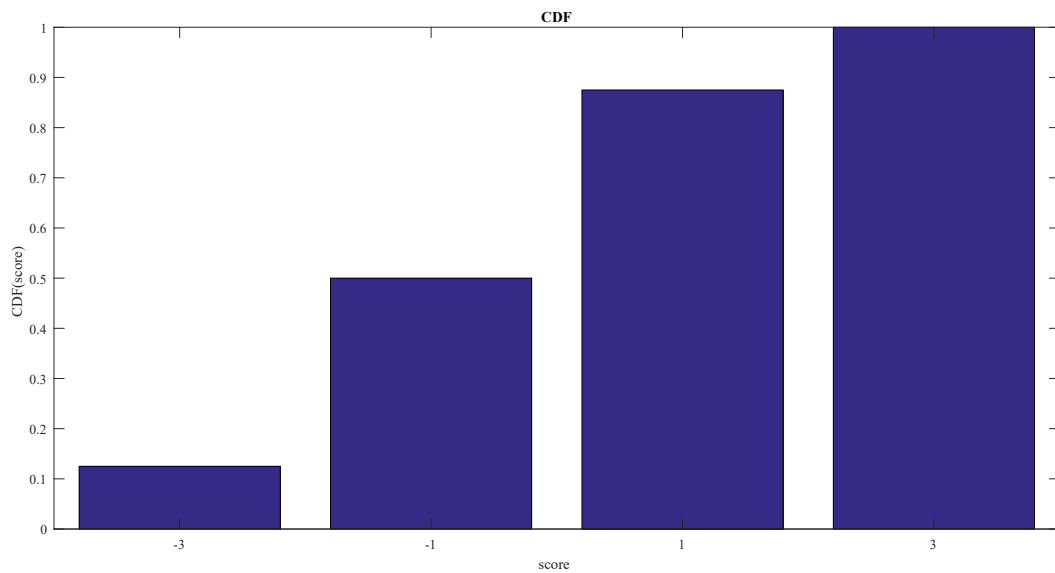
- a) The possible values of X are $\{-3, -1, 1, 3\}$, ie No heads, one heads, two heads, and three heads.
- b) There are 8 (2^3) possible outcomes when flipping a coin three times. The chance that $X = -3$ is the same as the chance all coin flips landed Tails, which is only one outcome, so $P(X = -3) = 0.125$
- c) The chance that $X = -1$ is the same as the chance that there is one Heads out of the three tosses. Using permutations, we get $\frac{3!}{2!} = 3$ possible outcomes, so $P(X = -1) = 0.375$
- d) PMF

- $P(X = -3) = 0.125$
- $P(X = -1) = 0.375$
- $P(X = 1) = 0.375$
- $P(X = 3) = 0.125$



CDF

- $P(X \leq -3) = 0.125$
- $P(X \leq -1) = 0.5$
- $P(X \leq 1) = 0.875$
- $P(X \leq 3) = 1$



Q3

a) Every roll will be either 1 or greater, so the minimum value cannot be lower than one.

$$P(X \geq 1) = 1$$

b) This is the same as the chance the none of the rolls are a 1. There are 5^4 possible outcomes where there are no 1s. Which means $P(X \geq 2) = \frac{5^4}{6^4} = 0.4823$

c) CDF

- $P(X \leq 1) = 1 - P(X \geq 2) = 0.5177$
- $P(X \leq 2) = 1 - P(X \geq 3) = 0.8025$
- $P(X \leq 3) = 1 - P(X \geq 4) = 0.9375$
- $P(X \leq 4) = 1 - P(X \geq 5) = 0.9877$
- $P(X \leq 5) = 1 - P(X \geq 6) = 0.9992$
- $P(X \leq 6) = 1$

