Pavel Ghazaryan | Exercise Sheet 9 | Dec. 4th 2021.
10756505

CExercise 77 | 1st toss: TH meaning H
2nd toss: HT meaning H
3rd toss: TT meaning T

on first toss

$$P(\text{Hunfair} \mid H) = \frac{P(H \mid \text{Hunfair}) \cdot P(\text{Hunfair})}{P(H)} =$$

$$= \frac{\frac{3}{4} \cdot \frac{1}{2}}{\frac{1}{2} \cdot \frac{3}{4} + \frac{1}{2} \cdot \frac{1}{4}} = \frac{\frac{3}{4} \cdot \frac{1}{2}}{\frac{1}{2}} = \frac{3}{4} \Rightarrow P(\text{Hunfair}) = \frac{3}{4}$$

on second toss

$$P(\text{Hunfair} \mid HH) = \frac{P(HH \mid \text{Hunfair}) \cdot P(\text{Hunfair})}{P(HH)} =$$

$$= \frac{\frac{3}{4} \cdot \frac{3}{4} \cdot \frac{3}{4}}{\left(\frac{3}{4}\right)^3 + \left(\frac{1}{4}\right)^3} = \frac{\frac{27}{64}}{\frac{27}{64} + \frac{1}{64}} = \frac{27}{64} \cdot \frac{64}{28} = \frac{27}{28} = P(\text{Hunfair})$$

on third toss

$$P(\text{Hunfair} \mid HHT) = \frac{\frac{9}{64} \cdot \frac{27}{28}}{\frac{27}{28} \cdot \frac{3}{4} \cdot \frac{3}{4} \cdot \frac{1}{4} + \frac{1}{28} \cdot \frac{1}{4} \cdot \frac{1}{4} \cdot \frac{3}{4}} = \frac{\frac{9}{64} \cdot \frac{27}{28}}{\frac{27}{28} \cdot \frac{9}{64} + \frac{1}{28} \cdot \frac{3}{64}} =$$

$$= \frac{9 \cdot 27}{27 \cdot 9 + 3} = \frac{9 \cdot 27}{246} = \frac{243}{246} = P(\text{Hunfair})$$

CExercise 83 | $P(X \leq 3) = P(X=2) + P(X=3) + P(X=1)$

$$= \frac{2}{9} + \frac{1}{3} \cdot \frac{1}{3} = \frac{3}{9} = \frac{1}{3} + P(x=1) = \frac{1}{3} + \frac{1}{9} = \boxed{\frac{4}{9}}$$

$$P(X \geq 5) = P(X=5) + P(x=6) = \frac{1}{3} \cdot \frac{1}{3} + \frac{2}{3} \cdot \frac{1}{3} =$$

$$= \frac{1}{9} + \frac{2}{9} = \boxed{\frac{3}{9}}$$

c) $P(4 \le X < 6) = P(X=4) + P(X=5) = \frac{2}{3} \cdot \frac{1}{3} + \frac{1}{3} \cdot \frac{1}{3} =$

$= \frac{2}{9} + \frac{1}{9} = \boxed{\frac{3}{9}}$

d) $P(X \le 10) = P(X=1) + P(X=2) + P(X=3) = \boxed{\frac{4}{9}}$

e) $P(X \ge 7) = 0$

f) $P(Y \le 4,5) = P(Y=2) + P(Y=3) + P(Y=4) =$

$= \frac{1}{81} + \frac{4}{81} + \frac{2}{81} = \frac{7}{81}$

g) $P(Y \ge 11,5) = P(Y=12) = \frac{2}{81}$

h) $P(\text{fo}Y \ge 6) = P(Y \ge 10) = P(Y=10) + P(Y=11) + P(Y=12)$

$= \frac{4}{81} + \frac{1}{81} + \frac{4}{81} + \frac{2}{81} = \frac{11}{81}$

(i) $P(\text{fo}Y \le .5) = 0$

C Exercise 84 | pmf of Ex 57 =>

1	2	3	4	5	6
$\frac{1}{9}$	$\frac{2}{9}$	$\frac{1}{9}$	$\frac{2}{9}$	$\frac{1}{9}$	$\frac{2}{9}$

cdf - ?