

Q9: 1) Event  $E = \{Y_1=5, Y_2=3, Y_3=9, Y_4=3, Y_5=8, Y_6=6, Y_7=7\}$

→ We want to find  $p(\text{die}=A|E) = p(A|E)$ ;

$$p(A|E) = \frac{p(E|A) \cdot p(A)}{p(E)} = \frac{p(E|A) \cdot p(A)}{p(E|A) \cdot p(A) + p(E|B) \cdot p(B)}$$

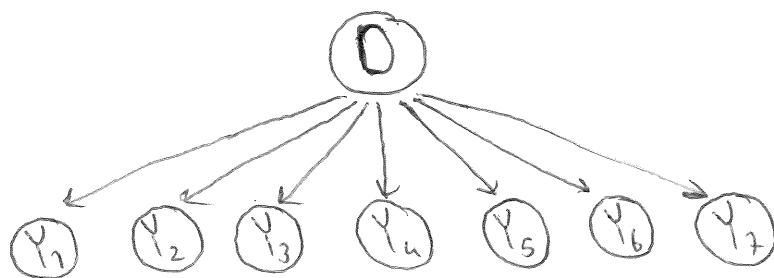
$$= \frac{\left(\frac{1 \times 3 \times 1 \times 3 \times 1 \times 2 \times 1}{20^7}\right) \cdot \frac{1}{2}}{\frac{18}{20^7} \cdot \frac{1}{2} + \left(\frac{2 \times 2 \times 1 \times 2 \times 2 \times 2 \times 2}{20^7}\right) \cdot \frac{1}{2}} = \frac{18}{18+64} = \frac{9}{41}$$

$$p(A|E) = \frac{9}{41}$$

2)  $p(A|E) = \frac{18/20^7 \cdot 1/3}{\left(\frac{18}{20^7} + \frac{64}{20^7} + \frac{1}{20^7}\right) \cdot \frac{1}{3}} = \frac{18}{83}$

$$p(B|E) = \frac{64}{18+64+1} = \frac{64}{83} \quad p(C|E) = \frac{1}{18+64+1} = \frac{1}{83}$$

3)



→ Here,  $D$  is the random variable corresponding to the die which can take 2 values ( $A, B$ ) in the first part and 3 values ( $A, B, C$ ) in the second part.

→  $Y_1, \dots, Y_7$  are the random variables corresponding to the die outcomes which can take values from 1 to 10 for  $A$  and  $B$  dice and from 1 to 20 for  $C$  die.