Q9)

dice	1	2	3	4	5	6	7	8	9	10	----	20
A	.3	.2	.15	.1	—	.05	—	0				0
B	.15	.15	—	.10	—	.05	.05	0				0
C	—	—	—	.05	—	—	—	—	—	—		

1) → "5, 3, 9, 3, 8, 4, 7" ⇒ $C_3 = 2$, $C_{4,5,7,8,9} = 1$

→ assuming $p(A) = p(B) = 1/2$

→ $$p(\text{dice} = A \mid \text{data}) = \frac{p(\text{data})\, p(\text{dice} = A)}{\sum_{\text{dice} \in \{A,B\}} p(\text{data})\, p(\text{dice})}$$

$$= \frac{0.15^2 \times 0.1 \times 0.05^4 \times 0.5}{(0.15^2 \times 0.1 \times 0.05^4 \times 0.5) + (0.1^6 \times 0.05 \times 0.5)}$$

$$= \frac{\frac{3}{20}\frac{3}{20}\frac{2}{20}\frac{1}{20^4}\frac{1}{2}}{\frac{18}{20^7 \times 2} + \left(\frac{2}{20}\right)^6 \frac{1}{20}\frac{1}{2}}$$

$$= \frac{18}{18+64} = \frac{9}{41}$$

2)

$$p(d = A \mid \text{data}) = \frac{18/20^9 \times \frac{1}{3}}{\frac{18}{20^9}\frac{1}{3} + \frac{1}{3}\frac{64}{20^9} + \frac{1}{3}\frac{1}{20^7}} = \frac{18}{83}$$

$$p(d = B \mid \text{data}) = \frac{64/20^9 \times \frac{1}{3}}{\frac{83}{20^9} \times \frac{1}{3}} = \frac{64}{83}$$

$$p(d = C \mid \text{data}) = \frac{1}{83}$$

3) a)