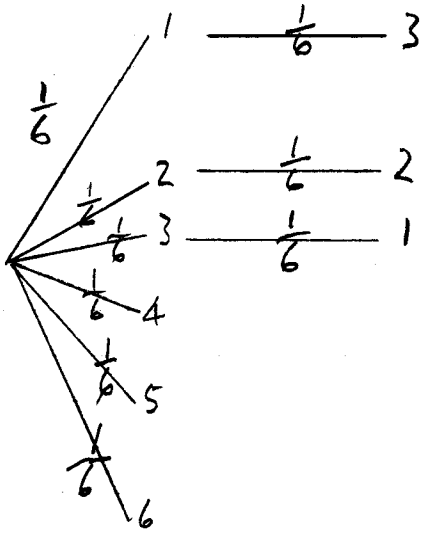
6) i)



$$P(\text{Final score } 4) = \frac{1}{6} + \frac{1}{6}\times\frac{1}{6} + \frac{1}{6}\times\frac{1}{6} + \frac{1}{6}\times\frac{1}{6}$$

$$= \frac{9}{36} = \frac{1}{4}$$

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ii) $P(\text{Final score } 4 \mid \text{thrown once}) = \dfrac{P(\text{Final score } 4 \cap \text{thrown once})}{P(\text{thrown once})}$

$$= \frac{\frac{1}{6}}{\frac{3}{6}} = \frac{1}{3}$$

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iii) $P(\text{Final score } 4 \mid \text{thrown twice}) = \dfrac{P(\text{Final score } 4 \cap \text{thrown twice})}{P(\text{thrown twice})}$

$$= \frac{\frac{1}{6}\times\frac{1}{6} + \frac{1}{6}\times\frac{1}{6} + \frac{1}{6}\times\frac{1}{6}}{\frac{3}{6}}$$

$$= \frac{\frac{3}{36}}{\frac{1}{2}} = \frac{1}{6}$$
