

$$P(X = 1 \mid X \leq 9) = \frac{P(\{1, 2, 3, 4, 5, 6, 7, 8, 9\} \cap \{1\})}{P(\{1, 2, 3, 4, 5, 6, 7, 8, 9\})} = \frac{1/10}{9/10} = \frac{1}{9}$$

$$P(X = 3 \mid X \leq 5) = \frac{P(\{1, 2, 3, 4, 5\} \cap \{3\})}{P(\{1, 2, 3, 4, 5\})} = \frac{1/10}{5/10} = \frac{1}{5}$$

$$P(X > 7 \mid X \geq 4) = \frac{P(\{4, 5, 6, 7, 8, 9, 10\} \cap \{8, 9, 10\})}{P(\{4, 5, 6, 7, 8, 9, 10\})} = \frac{3/10}{7/10} = \frac{3}{7}$$

$$P(X > 4 \mid X \geq 7) = \frac{P(\{7, 8, 9, 10\} \cap \{5, 6, 7, 8, 9, 10\})}{P(\{7, 8, 9, 10\})} = \frac{4/10}{4/10} = 1$$

$$P(X = 7 \mid X < 6) = \frac{P(\{1, 2, 3, 4, 5\} \cap \{7\})}{P(\{1, 2, 3, 4, 5\})} = \frac{0/10}{5/10} = 0$$