

概统第1次作业

12. 记 $A = \{\text{五局三胜制下甲赢}\}$, $B = \{\text{三局两胜制下甲赢}\}$

$$P(A) = \sum_{k=3}^5 P\{\text{甲赢的最后-局是第}k\text{局}\}$$

$$= p^3 + \binom{3}{2} p^2(1-p) + \binom{4}{2} p^3(1-p)^2$$

$$= 6p^3 - 15p^4 + 10p^5$$

$$P(B) = P\{\text{甲赢的最后-局是第2局}\} + P\{\text{甲赢的最后-局是第3局}\}$$

$$= p^2 + \binom{2}{1} p^2(1-p) = -2p^3 + 3p^2$$

$p > \frac{1}{2}$ 时, $P(A) - P(B) = 3p^2(p-1)^2(2p-1) > 0$.

故“五局三胜制”对甲有利。

21. 方程形式为: $x^2 + Bx + C = 0$. ~~$(B, C) = (1, 2)$~~

$$\text{故 } \{\text{方程有实根}\} = \{(B, C) \mid B^2 - 4C \geq 0, B, C \in \{1, 2, 3, 4, 5, 6\}\}$$

$$= \{(B, C) \mid (2, 1), (3, 1), (3, 2), (4, 1), (4, 2), (4, 3), (4, 4), (5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6), (6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)\}$$

$$\{\text{方程有重根}\} = \{(B, C) \mid B^2 - 4C = 0\}$$

$$= \{(B, C) \mid (2, 1), (4, 4)\}$$

$$\text{故 } P\{\text{方程有实根}\} = \frac{18}{36}, P\{\text{方程有重根}\} = \frac{2}{36} = \frac{1}{18}$$

22. 这里的停车站的个数是题目条件地并不很清楚. 在这里我们先按“车站包括始站和终站”这一情况处理.

那么乘坐下车的车站共有 ~~10~~ 10 种选择

$$(1) P_1 = \frac{\binom{10}{2} 8!}{10!}$$

$$(2) P_2 = \frac{\binom{10}{1} 9!}{10!}$$

$$(3) P_3 = \frac{\binom{10}{2} 8!}{10!}$$

28. (1) $P(A) = \cancel{P(A)} \cdot P(\overset{3}{A_i})$

$$= \sum_{i=1}^3 P(A_i) = 0.5 \times 0.4 \times 0.2$$

$$+ 0.5 \times 0.6 \times 0.2$$

$$+ 0.5 \times 0.4 \times 0.8 = 0.26$$

$$(2) P(B) = 1 - P(\bar{B}) = 1 - 0.5 \times 0.6 \times 0.2 = 0.98$$

29. (1) $P(N_1) = P_A P_B P_C$

$$(2) P(N_2) = 1 - P(\bar{N}) = 1 - (1 - P_A)(1 - P_B)(1 - P_C)$$

$$(3) P(N_3) = 1 - P(\bar{N}) = 1 - (1 - P_A^2)(1 - P_B^2)(1 - P_C^2)$$

$$(4) P(N_4) = P_A^2 \cdot P(N_2)$$

$$(5) P(N_5) = (1 - P_C)(1 - P_A P_B)^2 + P_C \cancel{[1 - (1 - P_A)^2]} [1 - (1 - P_B)^2]$$