

①

SOLUTIONS ASSIGNMENT #3
BZS - PROBABILITY & STATISTICS

① (a) There are 10^4 different numbers that can be drawn (0000 to 9999)

with the 4 digits 1, 2, 3, 4 any permutation is a winner.

$${}_4P_4 = 24 \quad (\text{24 ways of arranging the 4 digits})$$

$$\text{PROBABILITY OF WINNING IS } \frac{24}{10^4} = 0.0024$$

(b) There are ${}_4P_4 = 24$ ways of arranging 1, 2, 3, 3

BUT SOME PERMUTATIONS ARE THE SAME BECAUSE THERE ARE 2 3'S.

Given a certain position of 3's say
3 3 _ _ ; how many times
will this positioning occur?

$${}_2P_2 = 2 \text{ ways}$$

So every permutation is counted twice,
there are $\frac{{}_4P_4}{2P_2} = 12$ winning numbers

$$\frac{12}{10^4} = 0.0012$$

(c) $\frac{4P_4}{2P_2 \cdot 2P_2} = \frac{24}{4} = 6$

1122 2211
1212 2121
1221 2112

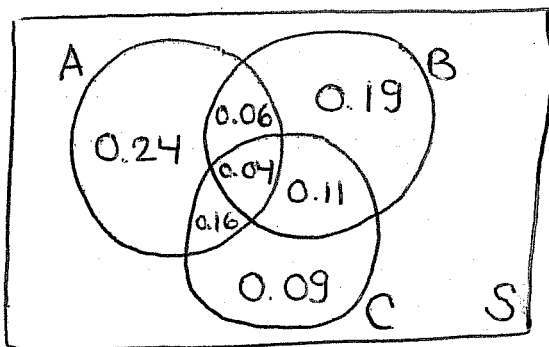
$P = \frac{6}{10^4} = 0.0006$

(d) $\frac{4P_4}{3P_3} = \frac{24}{6} = 4$

1222
2122
2212
2221

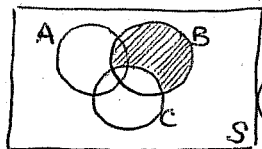
$P = \frac{4}{10^4} = 0.0004$

2



(a) $P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{0.10}{0.40} = 0.25$

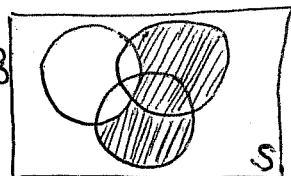
(b) $P(B|C') = \frac{P(B \cap C')}{P(C')} = \frac{0.25}{1-0.4} = 0.417$



$(B \cap C')$

(c) $P(A \cap B | C) = \frac{P(A \cap B \cap C)}{P(C)} = \frac{0.04}{0.4} = 0.1$

(d) $P(B \cup C | A^c) = \frac{P((B \cup C) \cap A^c)}{1 - P(A)} = \frac{0.19 + 0.11 + 0.09}{0.5} = 0.78$



$(B \cup C) \cap A^c$

(e) $P(A | B \cup C) = \frac{P(A \cap (B \cup C))}{P(B \cup C)} = \frac{0.16 + 0.04 + 0.06}{0.65} = 0.4$

(f) $P(A | B \cap C) = \frac{P(A \cap (B \cap C))}{P(B \cap C)} = \frac{0.04}{0.15} = 0.267$

(g) $\frac{P((A \cap B \cap C) \cap (B \cup C))}{P(B \cup C)} = \frac{0.04}{0.65} = 0.0615$