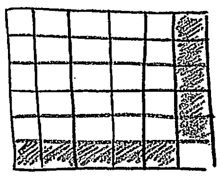
Wed. Sept 23, 2015 **MATH 340, Quiz 3** Prof. V. Panferov

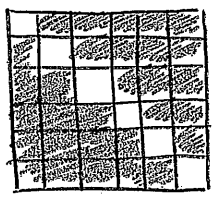
Name: (print) Solutions.

Each problem is worth 2 points. Show all your work.

1. Two fair dice are rolled. Find the conditional probability that at least one lands on 6 given that the dice land on different numbers.



at least one is a 6 and different # ; $P(A_6 D) = \frac{10}{36}$



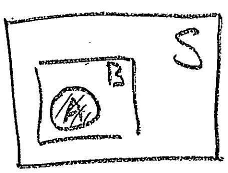
different # ; $P(D) = \frac{30}{36}$

$$P(A_6 / D) = \frac{10}{30} = \frac{1}{3}.$$

2. Let $A \subseteq B$. Express the following probabilities as simply as possible:

$$P(A|B), \quad P(A|B^c), \quad P(B|A), \quad P(B|A^c).$$

$A \subset B \iff$ if A occurs then B occurs



$$P(A/B) = \frac{P(AB)}{P(B)} = \frac{P(A)}{P(B)} \quad (AB = A)$$

$$P(A/B^c) = \frac{P(AB^c)}{P(B^c)} = 0 \quad (AB^c = \emptyset)$$

$$P(B/A) = \frac{P(AB)}{P(A)} = \frac{P(A)}{P(A)} = 1$$

$$P(B/A^c) = \frac{P(BA^c)}{P(A^c)} = \frac{P(B) - P(A)}{1 - P(A)}.$$

Please turn over...

3. Fifty-two percent of students at a certain college are females. Five percent of the students in this college are majoring in computer science. Two percent of the students are women majoring in computer science. If a student is selected at random, find the conditional probability that

(a) the student is female given that the student is majoring in computer science.

(b) this student is majoring in computer science given that the student is female.

$$P(F) = 0.52 \; ; \quad P(C) = 0.05 \; ; \quad P(FC) = 0.02$$

(a) $$P(F|C) = \frac{0.02}{0.05} = \frac{2}{5} = 0.4$$

(b) $$P(C|F) = \frac{0.02}{0.52} = \frac{1}{26} \approx 0.038$$

4. In a game of bridge, West has no aces. What is the probability of his partner's having

(a) no aces?

(b) two or more aces?

(a) West has 13 cards; his partner is dealt another 13 cards from the remaining 39.
In order to have no aces those 13 cards have to be chosen from 35 non-ace cards in the deck.

$$P(\text{"no aces"}) = \binom{35}{13} \Big/ \binom{39}{13} \approx 0.18176$$

(b) $$P(\text{"two or more aces"}) = 1 - P(\text{"no aces"}) - P(\text{"one ace"})$$

$$= 1 - \binom{35}{13} \Big/ \binom{39}{13} - 4 \cdot \binom{35}{12} \Big/ \binom{39}{13}$$

$$\approx 0.40730$$