AMS102: HOMEWORK 6

SOLUTIONS

Chapter 7

7.1. (a) Personal probability: this is just Tom's opinion unconfirmed by any experiments.

(b) Probability determined through relative-frequency approach: most likely the company tested doorbells before making such a statement.

7.13. (a) {Full-time, Part-time} (possible status of one student)

(b) Since no specific directions are given, we may assume that order of students matters as well (that is, we try to record as much information is possible). Thus, the sample space is {FFFF, FFFP, FFPF, FPFF, PFFF, FFPP, FPPF, PPFF, FPFP, PFPF, PFFP, PPPF, PPFP, PFPP, FPPP, PPPP} (that is, all possible combinations of four letters F or P).

(c) All integer numbers from 0 to 20.

7.15. (a) No: if we draw the king of hearts, both events A and B have occurred.

(b) Yes: we can't draw a card that is both a heart and a spade.

(c) No: we could draw the king of spades.

7.19. (a) Either Panthers beat Lions or Lions beat Panthers. The probability of the former event is 0.30. Therefore the probability of the latter event is 0.70.

(b) The intersection of two ovals is Lions beating both Tigers and Panthers. This is given as 0.20.

The probability that Lions will beat Tigers is 0.40, so the probability that Lions beat Tigers but not Panthers is $0.40 - 0.20 = 0.20$.

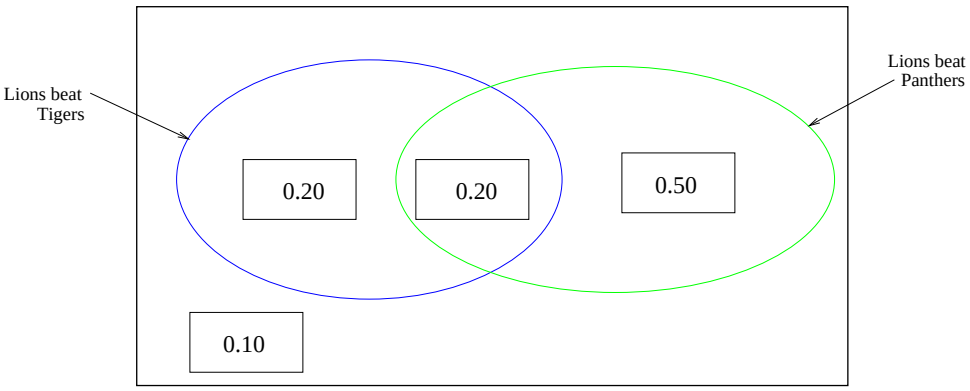
The probability that Lions will beat Panthers is 0.70 (see part (a)), so the probability that Lions beat Panthers but not Tigers is $0.70 - 0.20 = 0.50$.

The remaining probability (of Lions losing to both Tigers and Panthers) is $1 - 0.20 - 0.20 - 0.50 = 0.10$.

(The diagram is on the next page.)

(c) From the diagram: $0.20 + 0.20 + 0.50 = 0.90$.

(d) The chances of this are 0.20 (Lions beating both Tigers and Panthers) out of 0.40. Thus the conditional probability that Lions will beat the Panthers given that they beat the Tigers is $0.20/0.40 = 0.50$.



7.23. (a) 110 delinquents out of 1160. Probability: $\dfrac{110}{1160} \approx 0.095$.

(b) 20 delinquents out of 470 oldest girls. Probability: $\dfrac{20}{470} \approx 0.043$.

(c) $P(\text{delinquent and oldest}) = \dfrac{20}{1160}$.

$P(\text{delinquent}) = \dfrac{110}{1160}$.

$P(\text{oldest}) = \dfrac{470}{1160}$.

Hence $P(\text{delinquent and oldest}) \neq P(\text{delinquent}) \times P(\text{oldest})$. Therefore, the events are not independent.

7.31. Probability that a randomly selected student does not oppose the funding is $1 - 0.4 = 0.6$. Probability that none of the three independently selected students oppose the funding is $0.6 \times 0.6 \times 0.6 = 0.216$.