Math 36a Fall 2008 Homework 2 Solutions

(Chapter 2

Points

P 3. $EF = \{(1, 2), (1, 4), (1, 6), (2, 1), (4, 1), (6, 1)\}$.
$E \cup F$ occurs if the sum is odd or if at least one of the dice lands on 1. $FG = \{(1, 4), (4, 1)\}$.
EF^c is the event that neither of the dice lands on 1 and the sum is odd. $EFG = FG$. 5 (1 eac

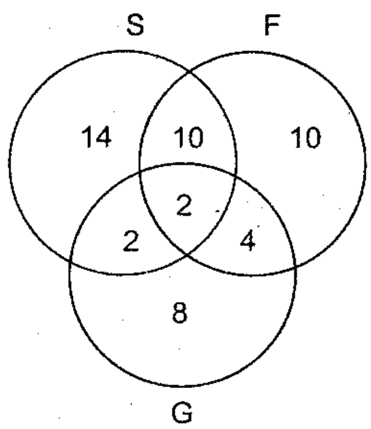
10. Let R and N denote the events, respectively, that the student wears a ring and wears a necklace.

(a) $P(R \cup N) = 1 - .6 = .4$ 2

(b) $.4 = P(R \cup N) = P(R) + P(N) - P(RN) = .2 + .3 - P(RN)$ 3
Thus, $P(RN) = .1$

12. (a) $P(S \cup F \cup G) = (28 + 26 + 16 - 12 - 4 - 6 + 2)/100 = 1/2$ 3
The desired probability is $1 - 1/2 = 1/2$.

(b) Use the Venn diagram below to obtain the answer 32/100. 4



(c) since 50 students are not taking any of the courses, the probability that neither one is taking a course is $\binom{50}{2}\Big/\binom{100}{2} = 49/198$ and so the probability that at least one is taking a course is 149/198. 3

18. $\dfrac{2 \cdot 4 \cdot 16}{52 \cdot 51}$

6

23. The answer is 5/12, which can be seen as follows:

$$\begin{aligned} 1 &= P\{\text{first higher}\} + P\{\text{second higher}\} + p\{\text{same}\} \\ &= 2P\{\text{second higher}\} + p\{\text{same}\} \\ &= 2P\{\text{second higher}\} + 1/6 \end{aligned}$$

Another way of solving is to list all the outcomes for which the second is higher. There is 1 outcome when the second die lands on two, 2 when it lands on three, 3 when it lands on four, 4 when it lands on five, and 5 when it lands on six. Hence, the probability is $(1 + 2 + 3 + 4 + 5)/36 = 5/12$. 6

56. Player B. If Player A chooses spinner (a) then B can choose spinner (c). If A chooses (b) then B chooses (a). If A chooses (c) then B chooses (b). In each case B wins probability 5/9. 10

T 11. $1 \geq P(E \cup F) = P(E) + P(F) - P(EF)$ 5

12. $P(EF^c \cup E^cF) = P(EF^c) + P(E^cF)$
$= P(E) - P(EF) + P(F) - P(EF)$ 6

15. $\dfrac{\binom{M}{k}\binom{N}{r-k}}{\binom{M+N}{r}}$ 7

60