

Statistics for the Life Sciences

Math 20340 Section 01, Fall 2008

Homework 1 Solutions

- **4.1:**

- **a:** Simple events 1, 2, 3, 4, 5, 6
- **b:** A: {2}; B: {2, 4, 6}; C: {3, 4, 5, 6}; D: {2}; E: {2, 4, 6}; F: \emptyset
- **c:** Each one should have probability $1/6$
- **d:** A: $1/6$; B: $1/2$; C: $2/3$; D: $1/6$; E: $1/2$; F: \emptyset

- **4.4:**

- **a:** .21
- **b:** .91

- **4.6:**

- **a:** Experiment in two stages
- **b:** There are 4 simple events: (Male, preschool), (Female, preschool), (Male, no preschool), (Female, no preschool),
- **c:** In the order listed above: $8/25$, $9/25$, $6/25$, $2/25$
- **d:** Male: $14/25$; $2/25$

- **4.9:**

- **a:** .58
- **b:** .14
- **c:** .46

- **4.10:**

- **a:** Simple events are number 1 through 36, number 0 and number 00
- **b:** Each should get probability $1/38$
- **c:** Simple events: {0, 00}; probability $1/19$
- **d:** $18/38 = 9/19$

• **4.14:**

- **a:** 24, not counting outcomes with ties (four ways to choose first, then three to choose second, then two to choose third and one to choose fourth)
- **b:** Each should get probability $1/24$
- **c:** There are six simple events in which Dave wins, so probability that Dave wins is $6/24 = 1/4$
- **d:** There are two simple events in which Dave wins and John is second, so probability is $2/24 = 1/12$
- **e:** There are six simple events in which Ed is last, so probability is $6/24 = 1/4$

• **4.15:**

- **a:** $140/300 = 7/15$
- **b:** $154/300 = 77/150$
- **c:** $160/300 = 8/15$

• **4.19:**

- **a:** $5.4.3 = 60$
- **b:** $10.9.8.7.6.5.4.3.2 = 3,628,800$
- **c:** $6.5.4.3.2.1 = 720$
- **d:** 20

• **4.20:**

- **a:** $5!/3!2! = 10$
- **b:** $10!/9!1! = 10$
- **c:** $6!/6!0! = 1$
- **d:** $20!/1!19! = 20$

• **4.26:** $4.12.4 = 192$

• **4.29:**

- **a:** $52.52.52 = 140,608$
- **b:** $52.51.50 = 132,600$ (order matters!)
- **c:** There are 140,608 different simple events. Of these, 52 involve all three selecting the same card. So probability is $52/140,608 = 1/2,704 \approx .00037$
- **d:** There are 132,600 simple events in which the three pick different cards, so probability is $132,600/140,608 = 1275/1352 \approx .943$

- **Bonus question:** The two probabilities don't add to 1 because there are some simple events that are not included in either event; namely, those simple events in which two of the students draw the same card and the third draws a different one

- **4.32:**

- **a:** $C_5^2 = 2,598,960$ (order doesn't matter)
- **b:** The number of simple events that consist of four aces is 48 (there are 48 cards remaining to add to the ace). Similarly, there are 48 simple events with four twos, 48 with four threes, etc.; $48 \cdot 13 = 624$ in all
- **c:** $624/2,598,960 \approx .00024$