Problem Set 5

Phil313Q

Due Nov. 1, 9:30am

For practice problems, see PIL ch. 4 # 2-4; ch. 5 #2-3
Show your work as much as possible. When symbolizing propositions (or events)
with capital letters, please circle your symbolization key. Here is an example
of something to include in a symbolization key:

H = flip heads

1   Categorical Probability

1. *One Card.* A card is drawn from a standard deck of fifty-two cards which
   has been well shuffled seven times. What is the probability that the card
   is:

   (a) Either red or a black ace?

   (b) Either an even number or a face card (jack, queen, king)?

2. *Two Cards.* When two cards are drawn in succession from a standard
   pack of cards, what are the probabilities of drawing:

   (a) two aces in a row, with replacement, and (b) without replacement;

   (c) two cards of the same suit, with replacement, and (d) without re-
   placement.

3. Suppose there are two urns, Urn A and Urn B. Urn A contains 4 red
   balls and 3 green balls. Urn B contains 2 red balls and 1 green ball. A
   trial consists of the following: *flip a fair coin. If heads, pick a ball from
   Urn A. If tails, pick a ball from Urn B. In either case, replace the ball
   to its original urn and shake the urns.* Imagine you run two consecutive
   trials (with replacement). What's the probability of the following event:
   pulling a green ball in the first trial and a red ball in the second trial?

2   Conditional Probability

4. Take a fair die. What's the probability of rolling an even number assum-
   ing you roll a number greater than 3?

5. Alex buys whiteboard markers from Walmart and Staples. 80% of his markers are from Walmart, and 20% are from Staples. As it turns out, 4% of Walmart markers are manufactured in error and have no ink as a result, and 1% of Staples markers have the same manufacturer error.

(a) What's the probability that a randomly chosen marker from Alex's collection is from Walmart and has the manufacturer error?

(b) What's the probability that a randomly chosen marker from Alex's collection has the manufacturer error?

(c) Assuming a randomly chosen marker from Alex's collection has the manufacturer error, what's the probability that it came from Walmart?

3 Challenge

6. Suppose there are two urns, Urn A and Urn B. In Urn A, 60% of the balls are red, and 40% of the balls are green. In Urn B, 20% of the balls are red, and 80% of the balls are green. A trial consists of the following: *flip a fair coin. If heads, pick two balls from Urn A with replacement. If tails, pick two balls from Urn B with replacement.* Assuming that you pick two red balls, what's the probability that both balls came from Urn A?

Hint. Use this symbolization key:

$\mathbf{A}$ = Pulled balls from Urn A in this trial (i.e., you flipped heads)

$\mathbf{B}$ = Pulled balls from Urn B in this trial (i.e., you flipped tails)

$\mathbf{R}_1$ = Pulled a red ball on *1*st draw in this trial

$\mathbf{R}_2$ = Pulled a red ball on *2*nd draw in this trial