Assignment 2

Ben Arancibia

February 17, 2015

Dobrow Chapter 3

3.3

If a tree has 70% change of being infected with root rot or bark disease there is a 40% chance it has root disease. If you take the compliment of 40%, (1-.4), then the infected tree has a 60% (.6) that it is bark disease.

P(Infected|Bark) = (.7) * (.6) P(I|B) = 0.42

3.6

Lottery tickets 1 and 1000 Tickets needed to buy to get probability of winning 50%

x=tickets needed to get probability of winning to 50%

.5=(1/1000)*x x=500 Tickets

3.8 50-50 chance that the queen carries hemophilia and each prince has 50-50 change of having hemophilia.

a) three princes without the disease, what the is the probability the queen is a carrier.

P(H|E) = P(H)P(E|H)/P(H)P(E|H + P(H$^{C)P(E|H}$C) .5^3 * .5 / (.5^3 * .5 + .5)

=.111

b) If there is a four prince what is the probability P(H|E) = P(H)P(E|H)/P(H)P(E|H + P(H$^{C)P(E|H}$C) .5^4 * .5 / (.5^4 * .5 + .5)

=0.05882353

3.16

$(n/k) = n!/k!(n-k)!$

a) Straight Flush (5 cards same suit) P(Straight Flush) = 36/(52/5) P(Straight Flush) = 36/(8.065818$e+67/(120*2.586232e+59)$) =1.385169e-05

b) Four of a Kind (four cards one face value and one other card) P(Four of a Kind) = 624/(52/5) =624/(8.065818$e+67/(120*2.586232e+59)$) =0.000240096

c) Full House (three cards of one face value and wo of another face value) P(Full House) = 3744/(52/5) =3744/(8.065818$e+67/(120*2.586232e+59)$) = 0.001440576

d) Flush (five cards same suit) P(Flush) = 5108/(52/5) =5108/(8.065818$e+67/(120*2.586232e+59)$) = 0.001965401

e) Straight (Five cards in a sequence) P(Straight) = 10200/(52/5) =10200/(8.065818$e+67/(120*2.586232e+59)$) = 0.003924646

f) Three of a Kind (Three cards) P(Three Kind) = 54912/(52/5) =54192/(8.065818$e+67/(120*2.586232e+59)$) = 0.02085141

g) Two Pair P(Two Pair) = 123552/(52/5) =123552/(8.065818$e+67/(120*2.586232e+59)$) = 0.04753901

h) One Pair P(One Pair) $= 1098240/(52/5) = 1098240/(8.065818e+67/(120*2.586232e+59)) = 0.4225689$

3.22

```
p <- as.numeric(1/6)
scenarios <- c(1, 2, 3)

for (i in scenarios) {
  # Accumulate the probability that fewer than the target # of sixes occurs.
   x <- 0
   # Total number of dice.
   n <- 6 * i
   # Calculate the probability for each possible # of sixes that is less than the goal.
   for (j in 0:(i-1)) {
     x <- x + dbinom(j, n, p)
   }
   print(paste("Probability of at least", i, "six in", n, "fair dice:", 1 - x))
}
```

```
## [1] "Probability of at least 1 six in 6 fair dice: 0.665102023319616"
## [1] "Probability of at least 2 six in 12 fair dice: 0.618667373732309"
## [1] "Probability of at least 3 six in 18 fair dice: 0.597345685947723"
```