STAT 3631/5631 Homework

Applied Statistics and Probability for Engineers
Montgomery and Runger

Solutions to Chapter 2: 51, 55, 58, 62, 67, 69, 71, 75, 77, 83, 87, 88.

2-51. a) P(A) = 0.4
b) P(B) = 0.8
c) P(A') = 0.6
d) P(A∪B) = 1
e) P(A∩B) = 0.2

2-55. a) S = {1,2,3,4,5,6,7,8}
b) 2/8
c) 6/8

2-58. Total possible: 10^{16}, Only 10^8 valid, P(valid) = $10^8/10^{16} = 1/10^8$

2-62. a) P(A) = 86/100 = 0.86
b) P(B) = 79/100 = 0.79
c) P(A') = 14/100 = 0.14
d) P(A∩B) = 70/100 = 0.70
e) P(A∪B) = (70+9+16)/100 = 0.95
f) P(A'∪B) = (70+9+5)/100 = 0.84

2-67. a) P($A \cup B \cup C$) = P(A) + P(B) + P(C), because the events are mutually exclusive. Therefore, P($A \cup B \cup C$) = 0.2+0.3+0.4 = 0.9
b) P ($A \cap B \cap C$) = 0, because $A \cap B \cap C = \varnothing$

c) P($A \cap B$) = 0 , because $A \cap B = \varnothing$
d) P($(A \cup B) \cap C$) = 0, because $(A \cup B) \cap C = (A \cap C) \cup (B \cap C) = \varnothing$
e) P($A' \cap B' \cap C'$) =1-[P(A) + P(B) + P(C)] = 1-(0.2+0.3+0.4) = 0.1

2-69.a) 70/100 = 0.70
b) (79+86-70)/100 = 0.95
c) No, P($A \cap B$) ≠ 0

2-71. a) 350/370

b) $\frac{345+5+12}{370}=\frac{362}{370}$

c) $\frac{345+5+8}{370}=\frac{358}{370}$

d) 345/370

2-75. a) P(A) = 86/100 b) P(B) = 79/100

c) $P(A|B)=\frac{P(A\cap B)}{P(B)}=\frac{70/100}{79/100}=\frac{70}{79}$

d) $P(B|A)=\frac{P(A\cap B)}{P(A)}=\frac{70/100}{86/100}=\frac{70}{86}$

2-77. Let A denote the event that a leaf completes the color transformation and let B denote the event that a leaf completes the textural transformation. The total number of experiments is 300.

(a) $P(B\mid A)=\frac{P(A\cap B)}{P(A)}=\frac{243/300}{(243+26)/300}=0.903$

(b) $P(A\mid B')=\frac{P(A\cap B')}{P(B')}=\frac{26/300}{(18+26)/300}=0.591$

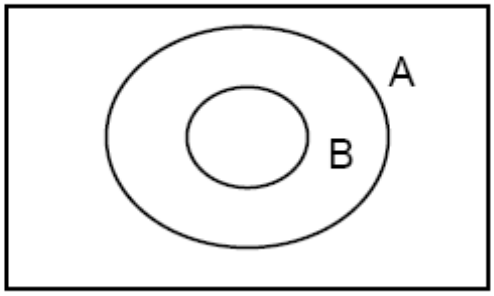
2-83. a) 20/100

b) 19/99

c) (20/100)(19/99) = 0.038

d) If the chips are replaced, the probability would be (20/100) = 0.2

2-87. No, if $B \subset A$, then $P(A/B) = \dfrac{P(A \cap B)}{P(B)} = \dfrac{P(B)}{P(B)} = 1$



2-88.