

### 3.1 Intro to Counting Methods (13.1 in textbook)

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①⑨ (1,4)  
(4,1)  
(2,3)  
(3,2)

②⑩ (1,6)  
(6,1)  
(2,5)  
(5,2)  
(3,4)  
(4,3)

③⑪ (1,1)  
(2,2)  
(3,3)  
(4,4)  
(5,5)  
(6,6)

④⑫ (1,1)  
(1,2)  
(2,1)  
(1,3)  
(3,1)  
(2,2)  
(1,4)  
(4,1)  
(2,3)  
(3,2)

## 3.2 The Fundamental Counting Principle

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(13.2 in textbook)

$$(5) 7 \times 6 = 42$$

$$(6) 12 \times 11 = 132$$

$$(7) 8 \times 7 \times 6 = 336$$

$$(8) 20 \times 19 \times 18 = 6840$$

$$(9) 4 \times 8 \times 3 \times 5 = 480$$

$$(10) 7 \times 5 \times 4 \times 6 = 840$$

$$(21) 26 \times 26 \times 26 = 17576$$

$$(31) \begin{array}{c} \underline{L} \quad \underline{T} \quad \underline{\quad} \quad \underline{\quad} \quad \underline{\quad} \quad \underline{\quad} \\ \underline{L} \quad \underline{10} \times \underline{9} \times \underline{8} \times \underline{7} \times \underline{6} \times \underline{5} \\ \underline{7} \times \underline{6} \times \underline{5} \times \underline{4} \times \underline{3} \times \underline{2} \times \underline{1} = \cancel{5040} \quad 1058400 \end{array}$$

$$(32) \begin{array}{c} \underline{T} \quad \underline{L} \quad \underline{J} \quad \underline{\quad} \quad \underline{\quad} \\ \underline{4} \times \underline{2} \times \underline{7} \times \underline{6} \times \underline{5} = 1680 \end{array}$$

$$(33) 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 720$$

$$(34) \begin{array}{c} \underline{3} \quad \underline{3} \quad \underline{2} \quad \underline{2} \quad \underline{1} \quad \underline{1} \\ \underline{3} \times \underline{2} \times \underline{1} \times \underline{3} \times \underline{2} \times \underline{1} \times \underline{2} = 72 \end{array}$$

### 3.3 Permutations and Combinations

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(13.3 in textbook)

$$(35) P(8,8) = 40320$$

$$(37) C(17,3) = 680$$

$$(38) C(6,4) = 15$$

$$(39) P(5,5) = 120$$

$$(40) P(7,7) = 5040$$

$$(41) C(10,3) = 120$$

$$(42) P(10,3) = 720$$

$$(43) C(9,5) = 126$$

$$(44) C(11,3) = 165$$

$$(45) C(17,8) = 24310$$

$$(46) P(17,8) = 980179200$$

$$(47) C(25,6) = 177100$$

$$(48) P(25,6) = 127512000$$

$$(55) C(6,2) \times C(8,3) = 840$$

$$(60) C(6,3) \times C(5,2) = 200$$

$$(61) P(12,2) \times C(10,2) = 5940$$

## 3.4 The Basics of Probability Theory

(14.1 in textbook)

$$(7) A = \{(1,6), (6,1), (2,5), (5,2), (3,4), (4,3)\}$$

$$(8) B = \{(1,4), (4,1), (2,3), (3,2)\}$$

$$(12) Y = \{y_b, y_r, y_y\}$$

$$(23) P(H) = \frac{13}{52} = \frac{1}{4}$$

$$O(H') = 39:13 \text{ or } 3:1$$

$$(24) P(F) = \frac{12}{52} = \frac{3}{13}$$

$$O(F') = 40:12 \text{ or } 10:3$$

$$(35) \begin{array}{c|cc} & S & S' \\ \hline S & SS & SS' \\ \hline S' & SS' & S'S' \end{array} \quad P(SS') = \frac{1}{2}$$

$$(36) P(SS) = \frac{1}{4}$$

$$(41) P(\text{GPA} \geq 2.5) = \frac{109 + 29}{320} = 0.431$$

$$(42) P(\text{off campus}) = 1 - P(\text{on campus}) \\ = 1 - \frac{179}{320} = 0.441$$

$$(55) \text{odds agst} = 7:5 \\ P(W) = \frac{5}{7+5} = \frac{5}{12}$$

$$(57) P(W) = 0.3 \\ \text{a) } O(W) = 3:7 \\ \text{b) } O(W') = 7:3$$

### 3.5 Complements and Unions of Events

(14.2 in textbook)

$$\textcircled{5} P(B') = 1 - 0.015 \\ = 0.985$$

$$\textcircled{6} P(F) = 1 - 0.965 \\ = 0.035$$

$$\textcircled{17} P(A \cup B) = P(A) + P(B) - P(A \cap B) \\ 0.85 = 0.55 + 0.4 - P(A \cap B) \\ P(A \cap B) = 0.1$$

$$\textcircled{19} P(A \cup B) = P(A) + P(B) - P(A \cap B) \\ 0.7 = 0.4 + P(B) - 0.25 \\ P(B) = 0.55$$

$$\textcircled{23} P(<55) = 1 - \frac{61+53}{1483} = 0.923$$

$$\textcircled{25} P(0-2 \text{ hrs } \cup <40\text{K}) = \frac{544}{1600} + \frac{592}{1600} - \frac{272}{1600} \\ = \frac{864}{1600} \\ = 0.54$$

$$\textcircled{29} 1 - 0.08 = 0.92$$

$$\textcircled{32} 1 - 0.03 - 0.08 = 0.89$$

$$\textcircled{44} \text{ If } P(E \cap F) = 0 \text{ then } E \cap F = \emptyset.$$

### 3.6 Conditional Probability and Intersection of Events

(14.3 in textbook)

$$(9) P(H|R) = \frac{n(H \cap R)}{n(R)} = \frac{13}{26} = \frac{1}{2}$$

$$(10) P(K|F) = \frac{n(K \cap F)}{n(F)} = \frac{4}{12} = \frac{1}{3}$$

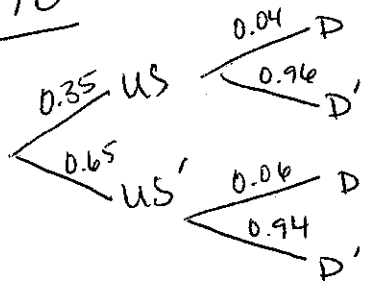
$$(11) P(7|F') = \frac{n(7 \cap F')}{n(F')} = \frac{4}{40} = \frac{1}{10}$$

$$(23) P(M|+) = \frac{72}{76} = 0.947$$

$$(24) P(M'|+) = \frac{4}{76} = 0.053$$

$$(25) P(+|M) = \frac{72}{80} = 0.9$$

67-70



$$(67) P(US \cap D') = 0.35 \times 0.96 = 0.336$$

$$(68) P(US' \cap D) = 0.65 \times 0.06 = 0.039$$

$$(69) P(US'|D) = \frac{P(US' \cap D)}{P(D)}$$

$$= \frac{0.65 \times 0.06}{0.35 \times 0.04 + 0.65 \times 0.06}$$

$$= 0.736$$

### 3.7 Expected Value

(14.4 in textbook)

$$\textcircled{13} 100\left(\frac{4}{50}\right) + 200\left(\frac{8}{50}\right) + 300\left(\frac{13}{50}\right) + 400\left(\frac{21}{50}\right) + 500\left(\frac{3}{50}\right) + 600\left(\frac{1}{50}\right) \\ = \$328$$

$$\textcircled{4} EV = \frac{2}{6}(2) + \frac{4}{6}(-1) = 0 \text{ (fair game)}$$

$$\textcircled{5} EV = \frac{16}{36}(4) + \frac{2}{36}(2) + \frac{18}{36}(-1) \\ = \$1.39$$

6: 1,5  
5,1  
2,4  
4,2  
3,3

7: 1,6  
6,1  
2,5  
5,2  
3,4  
4,3

8: 2,6  
6,2  
3,5  
5,3  
4,4

$$\textcircled{6} EV = \frac{6}{36}(4) + \frac{6}{36}(1) + \frac{24}{36}(-1) \\ = \$0.17$$

$$\textcircled{7} EV = \frac{13}{52}(5) + \frac{39}{52}(-5) = \frac{-130}{52} = -\$2.50$$

$$\textcircled{8} EV = \frac{12}{52}(15) + \frac{40}{52}(-5) = -\$0.38$$