

2366 Homework #5 Key

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1. 14532, 15432, 21345, 23451, 23514, 31452, 31542, 43521, 45213

2. a. 2134

b. 45312

c. 12534

d. 6714253

e. 31542678

3. 123, 132, 213, 231, 312, 321, 124, 142, 214, 241, 412, 421, 125, 152, 215, 251, 512, 521, 126, 162, 216, 261, 612, 621, 134, 143, 314, 341, 413, 431, 135, 153, 315, 351, 513, 531, 136, 163, 316, 361, 613, 631, 145, 154, 415, 451, 514, 541, 146, 164, 416, 461, 614, 641, 156, 165, 516, 561, 615, 651, 234, 243, 324, 342, 423, 432, 235, 253, 325, 352, 523, 532, 236, 263, 326, 362, 623, 632, 245, 254, 425, 452, 524, 542, 246, 264, 426, 462, 624, 642, 256, 265, 562, 526, 625, 652, 345, 354, 435, 453, 534, 543, 346, 364, 436, 463, 634, 643, 456, 465, 546, 564, 645, 654

4.a. $\frac{(1)(1)\binom{50}{3}}{\binom{52}{5}} \approx .00754$

f. $\frac{1}{\binom{50}{6}} \approx 6.29 \times 10^{-8} \frac{1}{\binom{60}{6}} \approx 1.997 \times 10^{-8}$

b. $\frac{\binom{4}{1}\binom{51}{4}}{\binom{52}{5}} \approx .3846$

g. $\frac{18}{38} \approx .47368$

h. $\left(\frac{36}{38}\right)^5 = .7631$

c. $\frac{52\binom{8}{1}\binom{3}{1}\binom{2}{1}\binom{4}{1}}{\binom{52}{5}} \approx .00096$

i. $\frac{5}{36} \approx .1389$ $\frac{21}{216} \approx .097$

d. $\left(\frac{1}{2}\right)^6 \approx .015625$

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

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

e. $\frac{33}{100} = 33\%$

j. $\frac{1}{\binom{200}{3}} \approx 7.614 \times 10^{-7}$

$$5. \left(\frac{1}{7}\right)\left(\frac{1}{7}\right) + \left(\frac{1}{7}\right)\left(\frac{1}{7}\right) + \left(\frac{1}{7}\right)\left(\frac{2}{7}\right) + \left(\frac{2}{7}\right)\left(\frac{1}{7}\right) + \left(\frac{1}{7}\right)\left(\frac{1}{7}\right) + \left(\frac{1}{7}\right)\left(\frac{1}{7}\right) = \quad (2)$$

$$\frac{1+1+2+2+1+1}{49} = \frac{6}{49} \approx .1224$$

$$6. a. \frac{1}{26} \quad b. \frac{1}{26 \cdot 25} \approx .001538 \quad c. \frac{{}^{29}P_3 \cdot (1) \cdot {}^{11}P_1}{26^2 P_{26}} \approx 6.41 \times 10^{-5}$$

$$d. \frac{{}^{13}P_3}{26^2 P_{26}} \approx 1.544 \times 10^{-17} \quad e. 1 - \frac{{}^{25}P_{25}}{26^2 P_{26}} \approx .9615$$

$$7. a. \frac{1}{7} \quad b. \frac{1}{12} \quad c. \frac{1}{365} \text{ (or } \frac{1}{366} \text{ approx)}$$

$$8. a. 1 - \frac{6}{7} \left(\frac{5}{7}\right) \left(\frac{4}{7}\right) \quad 4 \text{ people}$$

$$b. 1 - \left(\frac{11}{12}\right) \left(\frac{10}{12}\right) \left(\frac{9}{12}\right) \left(\frac{8}{12}\right) \quad 5 \text{ people}$$

$$c. 1 - \left(\frac{364}{365}\right) \left(\frac{363}{365}\right) \left(\frac{362}{365}\right) \left(\frac{361}{365}\right) \left(\frac{360}{365}\right) \left(\frac{359}{365}\right) \left(\frac{358}{365}\right) \left(\frac{357}{365}\right) \left(\frac{356}{365}\right) \left(\frac{355}{365}\right) \left(\frac{354}{365}\right) \left(\frac{353}{365}\right) \left(\frac{352}{365}\right) \left(\frac{351}{365}\right) \left(\frac{350}{365}\right) \left(\frac{349}{365}\right) \left(\frac{348}{365}\right) \left(\frac{347}{365}\right) \left(\frac{346}{365}\right) \left(\frac{345}{365}\right) \left(\frac{344}{365}\right) \left(\frac{343}{365}\right) \quad 23 \text{ people}$$

Answers may vary slightly if you use 366 instead

$$9. P(4H | \text{first head}) = (1) \left(\frac{1}{2}\right)^3 = \frac{1}{8}$$

$$10. a. \binom{n}{0} (1-p)^n \quad b. \binom{n}{0} (1-p)^n + \binom{n}{1} p (1-p)^{n-1} \quad c. 1 - \binom{n}{n} p^n - \binom{n}{n-1} p^{n-1} (1-p)$$

$$d. \binom{n}{n} p^n$$

$$11. a. 5/2 \quad b. 6 \quad c. 2302$$

$$12. a. \left(\frac{1}{2}\right) \left(\frac{1}{2}\right)^{10} = \frac{10}{4} \quad b.$$

$$\frac{1 - \frac{1}{6}}{\left(\frac{1}{6}\right)^2} = \frac{5}{6} \cdot 36 = 30$$

$$13. P(|X - \mu| > \sqrt{n}) \leq \frac{\sigma^2}{25} \cdot \frac{1}{\sqrt{n}} = \frac{6\sqrt{n}}{25}$$