

Julia Nelson

HW 2

"I pledge my honor that I have avoided the Stevens Honor System."

### Problem 1

1,000 professors

a) # ways Board can pick President out of the professors?

$$1000C_1 = 1000$$

b) # ways pick Pres + Provost?

$$1000C_2 = \frac{1000 \cdot 999}{2 \cdot 1} = 499,500$$

c) # Pick a team of 5 for search committee?

$$1000C_5 = \frac{1000 \cdot 999 \cdot 998 \cdot 997 \cdot 996}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 82,502,912,500$$

### Problem 2

M=1  
I=4  
S=4  
P=2

$$\frac{11!}{(1!)(4!)(4!)(2!)} \left\{ \frac{\text{Total!}}{(I's)(S's)(P's)(M's)} \right\}$$

$$= \frac{3,991,680}{(1)(24)(24)(2)} = 34,650 \quad \text{Total # perms or "words"}$$

Probability =  $\frac{1}{34,650}$

or

$$\frac{1}{11} \cdot \frac{4}{10} \cdot \frac{4}{9} \cdot \frac{3}{8} \cdot \frac{3}{7} \cdot \frac{2}{6} \cdot \frac{1}{5} \cdot \frac{2}{4} \cdot \frac{2}{3} \cdot \frac{1}{2} \cdot \frac{1}{1} \Rightarrow \frac{(4!)^2(2)}{11!} = \frac{1152}{3,991,680} = \frac{1}{34,650}$$

### Problem 3

Toss 10 times

Probability of MINIMUM 1 Heads?

$$P(X \geq 1) = P(X=1) + P(X=2) + P(X=3) + \dots + P(X=10)$$

$$= 10C_1 \left(\frac{1}{2}\right)^{10} + 10C_2 \left(\frac{1}{2}\right)^{10} + 10C_3 \left(\frac{1}{2}\right)^{10} + \dots + 10C_{10} \left(\frac{1}{2}\right)^{10}$$

$$= \left(\frac{1}{2}\right)^{10} (10C_1 + 10C_2 + 10C_3 + 10C_4 + 10C_5 + 10C_6 + 10C_7 + 10C_8 + 10C_9 + 10C_{10})$$

$$= \left(\frac{1}{2}\right)^{10} (10 + 45 + 120 + 210 + 252 + 210 + 120 + 45 + 10 + 1) = \left(\frac{1}{2}\right)^{10} (1023) = \frac{1023}{1024} = 0.9990234375$$

### Problem 4

25 Printers  
10 laser      15 inkjet  
 $N = 25$        $n = 6$        $K = 10$

$$P(X=3) = \frac{10C_3 \cdot 15C_3}{25C_6} = \frac{\frac{10 \cdot 9 \cdot 8}{3!} \cdot \frac{15 \cdot 14 \cdot 13}{3!}}{\frac{25 \cdot 24 \cdot 23 \cdot 22 \cdot 21 \cdot 20}{6!}}$$
$$= \left( \frac{720}{6} \cdot \frac{2730}{6} \right) = \frac{54600}{177100} = 0.308300395257$$
$$\left( \frac{127512000}{720} \right) \quad 30.83\%$$

### Problem 5