

## Supp. 4 Part I

1. (a)  $8 + 5 = 13$   
(b)  $8 \times 5 = 40$   
(c) Rule of sum for (a) and rule of product for (b)
5.  $2 \times 2 \times 1 \times 10 \times 10 \times 2 = 800$
8. (a)  $12!$  ways with no restrictions.  
(b)  $(4!)(8!)$  ways such that four are higher priority.  
(c)  $(4!)(5!)(3!)$  ways with four top, five mid, and 3 low priority.
9. (a)  $(14)(12) = 168$   
(b)  $(14)(12)(6)(18) = 18144$   
(c)  $(8)(18)(6)(3)(14)(12)(14)(12) = 73156608$
19. (a)  $7! = 5040$   
(b)  $(4)(3)(4)(2)(2)(1)(1) = (4!)(3!) = 144$   
(c)  $(3!)(5)(4!) = 720$   
(d)  $(3!)(4!)(2) = 288$
11. (a)  $2 + (4 \times 3) = 14$   
(b)  $14 \times 14 = 196$ , 14 there and 14 back  
(c)  $14 \times 13$
12. act,atc,cat,ata,tac,tca
13. (a)  $8!$   
(b)  $7!$  and  $6!$
14. (a) 42  
(b) 1680  
(c) 604,800  
(d) 1320
15.  $4!$
16. (a)  $40^{25}$   
(b)  $40^2 30^{23}$
20. (a)  $\frac{8!}{3!} = 6720$   
(b)  $6! = 720$
21. (a)  $\frac{12!}{3!2!2!2!}$   
(b)  $\frac{11!}{3!2!2!2!}$ (for AG) +  $\frac{11!}{3!2!2!2!}$ (for GA)  
(c)  $(\frac{7!}{2!2!})(\frac{6!}{3!2!})$
22.  $(\frac{6!}{2!}) + (\frac{6!}{2!^2}) + (\frac{6!}{2!^2}) = 6! = 720$

35. (a)  $6!$   
 (b)  $5!$  (A to the right of B)  $+ 5!$  (B to the right of A)  $= 2(5!)$
36. (a)  $2(7!)$   
 (b)  $7200$
37.  $\binom{16}{10}(9!)(5!)$
38.  $(8!)\binom{9}{6}(6!) = 2438533600$
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Supp. 4 Part II

5. (a)  $\frac{5!}{(5-3)!} = 60$   
 (b)  $\binom{5}{3} = 10$
7. (a)  $\binom{20}{12}$   
 (b)  $\binom{10}{6}\binom{10}{6}$   
 (c)  $\binom{10}{2}\binom{10}{8}(2 \text{ women}) + \binom{10}{4}\binom{10}{6}(4 \text{ women}) + \dots + \binom{10}{10}\binom{10}{0}(10 \text{ women})$   
 (d)  $\binom{10}{7}\binom{10}{5}(7 \text{ women}) + \binom{10}{8}\binom{10}{4}(8 \text{ women}) + \binom{10}{9}\binom{10}{3}(9 \text{ women}) + \binom{10}{10}\binom{10}{2}(10 \text{ women})$   
 (e)  $\sum_{i=8}^{10} \binom{10}{i}\binom{10}{12-i}$
9. (a)  $\binom{8}{2}$   
 (b)  $\binom{8}{4}$   
 (c)  $\binom{8}{6}$   
 (d)  $\binom{8}{6} + \binom{8}{7} + \binom{8}{8}$
11. (a)  $\binom{10}{7} = 120$   
 (b)  $\binom{8}{5} = 56$   
 (c)  $\binom{6}{4}\binom{4}{4} + \binom{6}{5}\binom{4}{2} + \binom{6}{6}\binom{4}{1} = (15)(4) + (6)(6) + (1)(4) = 100$
13.  $\binom{8}{4}\binom{7!}{4!2!}$
15. (a)  $\binom{15}{2}$   
 (b)  $\binom{25}{3}$  possible triangles or planes, and  $\binom{25}{4}$  possible tetrahedra
18. (a)  $\frac{10!}{4!3!3!}$   
 (b)  $\binom{10}{8}2^2 + \binom{10}{9}2 + \binom{10}{10}$   
 (c)  $\binom{10}{4}(\text{four 1's, six 0's}) + \binom{10}{2}\binom{8}{1}(\text{two 1's, one 2, seven 0's}) + \binom{10}{2}(\text{two 2's, eight 0's})$
19. (a)  $\binom{10}{3} + \binom{10}{1}\binom{9}{1} + \binom{10}{1} = 220$   
 (b)  $\binom{10}{4} + \binom{10}{2} + \binom{10}{1}\binom{9}{2} + \binom{10}{1}\binom{9}{1} = 705$   
 (c)  $(2^{10})(\sum_{i=0}^5 \binom{10}{2i})$
23. (a)  $\binom{12}{9}$

$$(b) \binom{12}{9} (2^3)$$

$$(c) \binom{12}{9} 2^9 (-3)^3$$

$$25. (a) \binom{4}{1,1,2} = 12$$

$$(b) \binom{4}{0,1,1,2} = 12$$

$$(c) \binom{4}{1,1,2} (2)(-1)(-1)^2 = -24$$

$$(d) \binom{4}{1,1,2} (-2)(3)^2 = -216$$

$$(e) \binom{8}{3,2,1,2} (2)^3 (-1)^2 (3)(-2)^2 = 161,280$$

$$26. (a) \binom{10}{2,2,2,2,2}$$

$$(b) \binom{12}{2,2,2,2,4} (2)^2 (-1)^2 (3)^2 (1)^2 (-2)^4$$

$$(c) \binom{12}{0,2,2,2,2,4} (1)^2 (-2)^2 (1)^2 (5)^2 (3)^4$$