Hw 6 Counting

Daniel Yang

6.1.

3.
a. 4^{10}
b. 5^{10}

7.
26^3 because
26 letters
and 3 slots

21. 7 nums
a. 56, 63, 70, 77,
84, 91, 98
b. 5 nums
55, 66, 77, 88,
99.
c. 1 num. 77

28.

Sum rule

let a = num ways for 3 dig, 3 let
let b = num ways for 3 letters, 3 dig

a = 10×10×10×26×26×26
b = 26×26×26×10×10×10

a == b.
answer = a+b

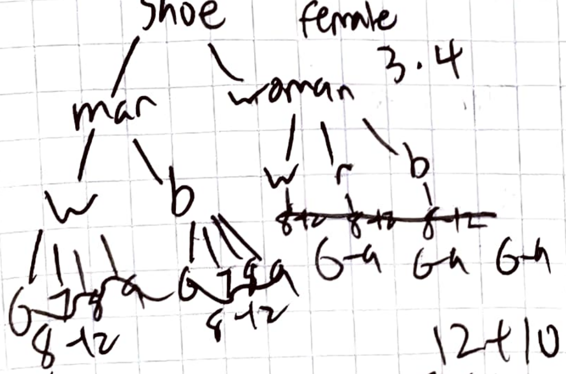
35.
a : 0
b. ~~*~~ 5!
c. 6!
~~*~~ d. 7·6·5·4·3
$= \frac{7!}{2!}$

69.

sum
12 + 10 = 22

product female
3.4

product rule male
2.5



12+10 = 22
the store needs ~~8+15~~ = ~~38~~ pairs

Daniel Yang

6.2. 2

3.

a. 3 socks

b. 14 socks

8, 12, 16, 20, 24, 28,

5. set of mod by 4

$\{0, 1, 2, 3\}$

set of 5 numbers

$\{a_1, a_2, a_3, a_4, a_5\}$

Since this function is onto, there must exist a remainder with ≥ 2 ints.

7.

$a_i, a_{i+1}, a_{i+2} \ldots a_{n-1}$

we know that $a_i \bmod n$ is distinct for the values of the indices.

Since there are N values of mod, and N nums in set, the function is bijective

18.

a. If a class has ≥ 5 students this is true.

If not, it must have < 5 students.

The ~~smallest~~ closest number before 5 is 4.

If there are 4 males, there must be $9 - 4 = 5$ females

23.

A B C D E

Daniel Yang

6.3

3. b. 123 134 145
124 135
125

234 245
235

345

a. 123 132 213 312
124 142 214 412
125 152 215 512
134 143 314 413
135 153 315 513
145 154 415 514

5.
a
$6_C3 \cdot 3! = 720/6 = 120$
b. $6_C5 \cdot 5! = 720/1 = 720$
c. $8_C1 \cdot 1! = 40320/5040 = 8$

6. $5_C1 = 5$
b. $5_C3 = \frac{4 \cdot 5}{2} = 10$
c. $8_C4 = \frac{5 \cdot 6 \cdot 7 \cdot 8}{2 \cdot 3 \cdot 4} = 70$

N3

Since we can ignore this constant and Realize the 2 ways that this is possible are:

ABAB... so... $2 \cdot (N! \times N!)$
BABA. =

21.
a. $5 \cdot 4! = 120$
b $3! \cdot 4 = 24$
c. 120.
d. 24
e. 6
f. 0.

30.
a. $C(16,5) - C(9,5) = 4242$
b. $4242 - C(7,5) = 4221$

Pand Yang

6.4

3. $x^6 + 6x^5y + 15x^4y^2 + 20x^3y^3 + 15x^2y^4 + 6xy^5 + y^6$

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1

1.

Theorem

$$(x+y)^n = \sum_{i=0}^{n} \binom{n}{i} x^{n-i} \cdot y^i$$

$$x^4 + 4x^3y + 6x^2y^2 + 4xy^3 + y^4$$

$$\binom{4}{0}, \binom{4}{1}, \binom{4}{2} \ldots \binom{4}{4}$$

7. $2^{10} \cdot -1 \cdot 92378$

8. $\binom{17}{8} \cdot 3^8 \cdot 2^9$

13.

1 9 36 84 126 126 84 36 9 1

16.

Show that if ~~n≥1~~, $n > 1$, then

$$\binom{n}{n/2} \geq 2^n/n$$

idk

27

Prove.

$$\sum_{k=0}^{r} \binom{n+k}{k} = \binom{n+r+1}{r}$$

$n+r+1$

r

$$\binom{n+r}{r} \quad \binom{n+r}{r-1}$$

Dawit Yemer

7.1

5.

$AA = \frac{1}{4}$

$AB = \frac{1}{4} = \frac{1}{2}$

$BA = \frac{1}{4}$

$BB = \frac{1}{4}$

7.

$A \cdot A \cdot A \cdot A \cdot A \cdot A = A^6 = \frac{1}{64}$

13

$C(4,1) + C(4,2) + C(4,3) + C(4,4) \cdot C(48,4)$

$= 1 + 4 + 6 + 4 = 15$

$194580 \cdot 15 = 2918700$

20.

$4 \cdot \frac{1}{2598960}$

25a

$\frac{1}{50c6} = \frac{1}{15890700}$

35.

a. 18/38

b. $(18/38)^2$

c. 2/38

d. $(36/38)^5$

e. $6/38 \cdot 32/38$