Problem 11

- ea - -

1) "ea" is fixed, so disregard

2) how many ways can _ _ st be arranged?

_ is other letters $3 \cdot 2 \cdot 1 = 6$ ways

3) Case 1 $6 \cdot 24 = 144$

Case 2 — is either +/s

6

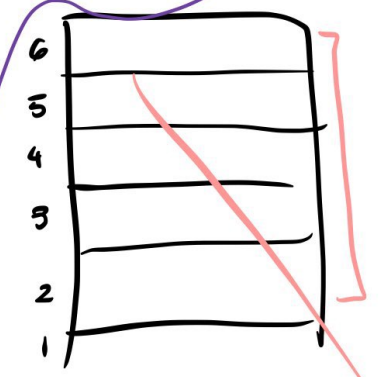
+ s +
s s +
+ + s
s + s
s + +
~~s s +~~
~~+ + s~~
~~+ s s~~
~~+ s +~~
+ s s
~~s + +~~
~~s + s~~

+/s _ s +
+/s _ + s
s +/s _ +
+ +/s _ s
+ s _ +/s
s + _ +/s

$^{2}24 \cdot \frac{6}{144}$

$144 + 6 = \boxed{150 \text{ ways}}$

Problem 2 | Attempt 1



Alice
Bob
Carlos

Case 1 | All different, ∅ third floor

4 3 2 = 24
Alice Bob Carlos

No 3rd floor

Case 2 | All different, third floor

4 1 3 = 12 — Bob third
Alice Bob Carlos
+
4 3 1 = 12 — Carlos third

= 24

Case 3 | 2 same, 1 different | ∅ third

4 3 = 12
A B C
+
4 3 1 = 12

= 24

1
A

Case 4 | 2 same, 1 different | third

4 1 1 + 4 1 1 = 8

Case 5 | All same

5 1 1 = 5
A B C

1 24
3
72

WRONG, too inefficient

80 + 5 = 85 ways

Attempt 2

4 5 5
Alice Bob Carlos

20
5

100 different configurations

Problem 3

a) total 21 Pokemon Cards

7 water W
5 fire F
9 other O

W F O

Case 1 all different types

$_7C_1 \; _5C_1 \; _7C_1$

9 5 7
O F W

$= 45 \cdot 7 = 315$

Case 2 2 of other + W/F

$_9C_2 \times {}_{12}C_1$

9 8 7 + 9 8 5
O O W O O F

432

$$\begin{array}{r} 432 \\ \times\ 7 \\ \hline 504 \end{array}$$

$$\begin{array}{r} 432 \\ -\ 5 \\ \hline 360 \end{array}$$

Case 3 3 of oth

$_9C_3$

84

$$\begin{array}{r} 504 \\ 360 \\ \hline 864 \end{array}$$

831 way

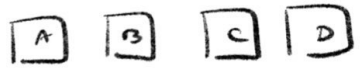
stars & bars method
10 cards 2 bars

b)

$_{12}C_2$

66 Ways

④ printers



Attempt 1

6 identical copies of 1 document

single digit

5 1 0] 2
6 0 1

4] 3

3 3 0] 4
3 2 1
3 1 3
3 0 3

2] 5

1] 6

0] 7

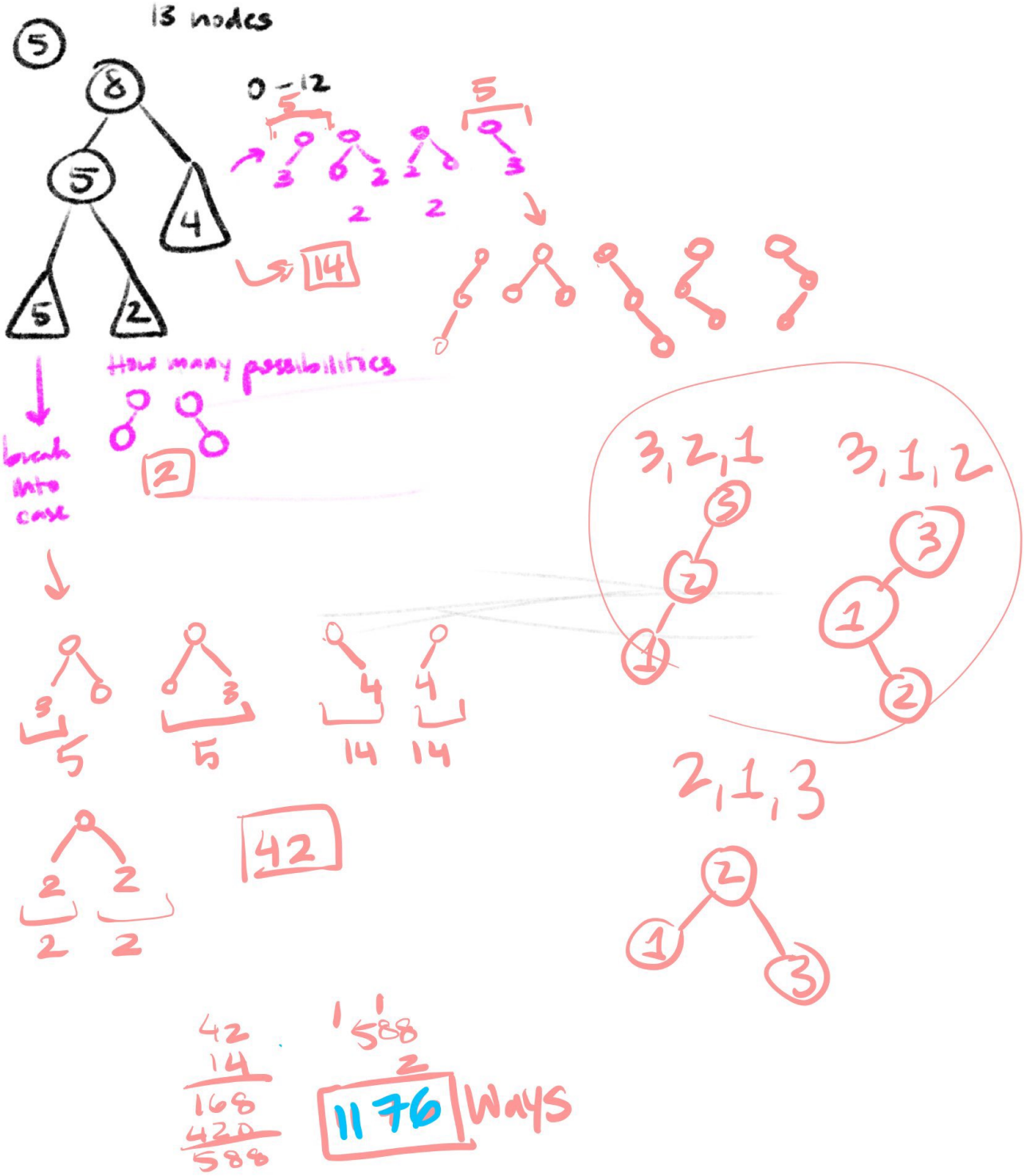
$2+3+4+5+6+7 = 27$

indistinguishable object over indistinguishable pan

7

Attempt 2

8


13 nodes
0-12
How many possibilities
break into case
14
42
3,2,1
3,1,2
2,1,3
42
14
168
420
588
1176 ways