Subject: Recitation 15

Year: Month: Date:

BOOKKEEPER

1 The Tao of ~~Bookkeeper~~

1 $4!$

2 $4!$

3 A 2

B 3

C 2

D 3

E 1

F 1

4 ~~Total Surjective~~ 2-to-1

5 $\frac{4!}{2}$

6 $\frac{6!}{3!}$

7

P

REAEEK

~~KEEPER~~

1 2 3

1 3 2

2 1 3

2 3 1

3 1 2

3 2 1

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8 6-to-1

7 $\frac{6!}{3!}$

13 $\frac{(1+2+2+3+1+1)!}{1!2!2!3!1!1!}$

10 $\frac{10!}{}$

11 $\frac{10!}{2!}$

12 $\frac{10!}{2!2!}$ 5

14 $\frac{(1+4+2+2)!}{1!5!\cdot 2!2!}$

15 $\binom{n}{k}$

2 Pigeonhole Principle

1 Days of the year → People
365 B.Day 500

2 yes. student Ids → $\{1,\dots,81\}$
115 54m

3 Classes of 37 ← ints
37 100

37

4

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3 More Counting Problems

1 Set we know: Split every permutation into first k and the rest. Undo the permutations of the splits by the divison rule.

$\frac{n!}{k!(n-k)!}$

Bijection: take the first k.

2 $\binom{16}{4}$ 12 0s and 4 1s.

3 $\left(\frac{8!}{2!\,2!\,1!\,1!\,2!}\right)$

4 $\frac{102!}{2^{51}\,51!}$

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4 Fun with Phonology: Hawaiian

1 $|VVVV| + |CVVV| + |VCVV| + |VVCV| + |CVCV| = 25^4 + 8 \cdot 25^3 + 8 \cdot 25^3 + 8 \cdot 25^3 + 8^2 \cdot 25^2$

2 Because when we have CC we always have CV then $K \leq n/2$

$\longrightarrow |A| = \sum_{i=0}^{n/2} |A_i|$

3 we merge all K CV's into 0s. So we have $n-k$ digits.

4 $|A_K| = \binom{n-k}{k} \cdot 8^k \cdot 25^{n-k}$

5 ↑

6 $|A| = \sum_{k=0}^{n/2} |A_k| = \sum_{k=0}^{n/2} \binom{n-k}{k} \cdot 8^k \cdot 25^{n-k}$