# §7.1 Homework Solutions

1). [BB]. (Note that the books are <u>different</u>. Hence $P(13,8)$ <u>not</u> $C(13,8)$)

7) a) $P(14,14) = 14!$

b) $10!$ ways of "gluing" the boys together in some way and $4!$ for the girls. Then there are $2!$ ways of ordering the two groups. So $\underline{10!4!2!}$
(Don't try this at home kids!)

c) $4!$ ways to glue the girls together and $11!$ ways to order the 10 boys and 1 "multigirl"
So $\underline{4!11!}$

d) c) − b) = $\underline{4!\,11! - 10!\,4!\,2!}$

8) (See Problem 3 on P207) a) $\frac{14!}{14} = 13!$

b) Glue the boys and girls as before, in $10!\,4!$ ways. Then only one way to form a circle (with them facing inwards) so answer is $10!\,4!$

c) Glue the girls in $4!$ ways. The 11 objects can then be put in a circle in $10!$ ways so $4!10!$
d) c) − b) = $\underline{4!10! - 4!10!} = \underline{\underline{0}}$

11) To find # strings containing "bge" imagine gluing these letters together. There are then 5 objects to be ordered ("bge", a, c, d, f) in $5!$ ways, so $5!$
Similarly there are $5!$ strings containing "eaf".
<u>But</u> we are double-counting strings containing "bgeaf" and there are $3!$ of these.
So number of strings <u>NOT</u> containing these is $\underline{7! - 5! - 5! + 3!}$ (by Inclusion-Exclusion Principle)

15) First find number of strings with 2 letters between a and b:
There are $5 \times 4$ ways of choosing the first and second of these letters. Glue all 4 together.
There are now "axyb" and 3 remaining letters to be ordered in $4!$ ways
giving $20 \times 4!$ such strings.

Similarly there are $5 \times 4 \times 3$ ways of choosing a string 'axyzb'
and 2 remaining letters, so $3!$ ways of ordering these with 'axyzb'

These possibilities are mutually exclusive so answer is $(20 \times 4!) + (60 \times 3!)$
by the Addition Rule.

But there are an equal number of possibilities with the b coming before the a so the answer is doul
ie 2x((20x4!)+(60x3!))