CSE 21 Homework 1
Chapter 2

Note: All of these problems have the solutions in the book so I will attempt to explain some of them and give clarifications instead of just copying down the solutions already given.

Problem 2.21 **Solution** Here combinations can be used since the order in which students are selected is not important. Note that when using combinations the order of the things selected is not important:

$$C(n, r) = \frac{n!}{r!(n-r)!}$$

is the number of ways r objects selected from n things can be arranged. This makes since since in permutations order is important and then selection gives

$$P(n, r) = \frac{n!}{(n-r)!}.$$

Here the order is important. How many ways can r things be arranged $r!$. So we get

$$P(n, r) = C(n, r) \times r!.$$

Problem 2.29 **Solution** See the diagram in the book.

Problem 2.30 **Solution** Again see the diagram in the book.

Problem 2.39 **Solution** Notice here that permutations are used because when spelling a word in the english language order is certainly important.

Problem 2.42 **Solution**

i. There are two possible patterns BGBGBGBG, or GBGBGBGB. For each pattern there are $P(4, 4) = 4!$ arrangements for each sex. Thus, the solution is $2 \times P(4, 4)^2$.

ii. If B1 and G1 are to sit together they have 7 possible choices for each pattern where they can sit and $P(3, 3)$ ways to seat the rest. So the solution is $2 \times 7 \times P(3, 3)^2$

iii. i -ii

Problem 2.44 **Solution** Notice that with replacement each time you draw from the urn it has the same number of balls. Also, since these are ordered we must again use permutations.

Problem 2.46 **Solution** The order in which this problem is done can make it easier.

i. consider the first digit first for which there are 3 choices.

ii. It is best to first consider the restriction on the last digit for which there are 5 choices, then the restrictions on the first digit 8 choices (excluding 0 and the third digit) and finally the restriction on the second digit for which there are also 8 choices (excluding) the two already selected.

iii. i - ii.

iv. Do the same pattern of restrictions as for problem ii.

Problem 2.60 **Solution** Again use combinations since order is important

Problem 2.66 The question should state whether they want ordered or unordered, but we will assume ordered by default.

Solution For this problem we divide n things into 2 unempty blocks say (A, B).

Now to pick A there are all choices except the emptyset and the set of everyone. So there are $2^n - 2$ ways to arrange A. Once, A is selected B is fixed as A^c so that there are actually $2^n - 2$ total ordered ways to select the 2 teams. Note that this is for an ordered split to get the unordered divide by 2 which gives $2^{n-1} - 1$ the solution in the book. I guess they assumed unordered.

Problem 2.74 **Solution** The tree is in the book.