



Department of
Industrial Engineering

IE 454 Combinatorial Analysis

<http://ie454.cankaya.edu.tr>

Fall 2010 Tuesday 9:40-12:30 A201

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SOLUTION for QUIZ 1 (Open Notes)

There are 23 regular and 11 irregular students who are currently taking IE 454. Out of these students, only 20 are female. The lecture is scheduled in room A201 on September, 12. Being in the state of rush, 6 students enter the class after 9:45.

1. How many different ways of having at least 2 female students among 6, late for the quiz?

$$\#(\text{all}) - \#(\text{no female}) - \#(\text{one female}) = \binom{34}{6} - \binom{20}{0} \binom{14}{6} - \binom{20}{1} \binom{14}{5}$$

2. What is the probability that all will sit at the rear row? The classroom has five rows for seating.

Rows (distinguishable): 1,2,3,4,5 \leftrightarrow cells (can be empty) $k = 5$

Late Students (identical) \leftrightarrow balls $n = 6$

$$P(\text{all will sit at the rear row}) = \frac{1}{\binom{6+5-1}{5}}$$

3. What is the probability that at least four will sit together at any row? The classroom has five rows for seating.

Let us first group 4 students as a superset.

Rows (distinguishable): 1,2,3,4,5 \leftrightarrow cells (can be empty) $k = 5$

Late Students \leftrightarrow balls $n = 3$ (2 standard + one superset)

$$\#(\text{the group of four will sit at the same row, rest two anywhere}) = \binom{3+5-1}{2}$$

$$P(\text{the group of four will sit at the same row, rest two anywhere}) = \frac{\binom{3+5-1}{2}}{\binom{6+5-1}{5}}$$