COMP 3011 Assignment 3

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1.

The probability of a classroom does not enter by a student is $1 - 1/n$.

For each classroom $i \in \{1, 2, ..., n\}$, we can define a indicator random variable,

$$X_i = I\{\text{classroom } i \text{ is empty after all } m \text{ students have gone to the classrooms}\}$$

Therefore, $E[X_i] = Pr\{\text{classroom } i \text{ is empty after all } m \text{ students have gone to the classrooms}\} = (1-1/n)^m$

Then, let X be the number of empty classrooms after all student m has gone to the classroom. By linear of expectation, $E[\sum_{i=1}^{n} X_i] = \sum_{i=1}^{n} E[X_i] = \sum_{i=1}^{n}(1 - 1/n)^m = n(1 - 1/n)^m$.

2.