MATH 1050 (Combinatorics)
Midterm Information Sheet

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• The midterm is 50 minutes long.
• There will be 6 questions (each possibly broken into few parts).
• The questions are similar to the homework problems. Please make sure you can do all the homework problems.
• One question asks to state some definitions and state a theorem (discussed in class) without proof. Examples are: Euler’s theorem on Eulerian trails in a graph, Turan’s theorem, Ramsey theorem, Max-Flow-Min-Cut theorem, König’s theorem, Philip Hall’s theorem. Examples of definitions: degree of a vertex in a graph, a flow in a network, value of a flow in a network, a cut in a network, capacity of a cut in a network, a matching in a graph, a vertex cover in a graph.
• There will be one question related to binomial numbers. You do not need to know Sterling numbers of first kind. You only need to know the definition of Sterling numbers of second kind $S_{n,k}$. You need to know the formula for the number of non-negative integer solutions of $n = x_1 + \cdots + x_k$, that is, $\binom{n+k-1}{k-1}$.
• There will be a problem related to generating functions, exponential generating functions and recurrence relations.
• There will be a problem related to basic definitions in graph theory (e.g. degree of a vertex), Euler’s theorem and Turan’s theorem.
• There will be a problem about linear programming: the question will ask to draw the picture for a given linear programming (in very few variables) and write down its dual.
• There will be a problem related to flows in networks and matching.