CS105L: Discrete Structures
I semester, 2005-06

Tutorial Sheet 11: Discrete Probability: Sudoku

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	6		1		4		5	
		8	3		5	6		
2								1
8			4		7			6
		6				3		
7			9		1			4
5								2
		7	2		6	9		
	4		5		8		7	

Figure 1: Fill in the grid so that each row, each column and each of the 3×3 boxes marked contain all the digits 1 through 9.

1. Solve the puzzle given in Figure 1.

For the rest of the problems we will assume that each box in the grid is filled independently with a digit chosen uniformly at random from 1 to 9. A filling of any subset of squares in the grid is *feasible* if it does not violate any of the rules.

2. What is the probability of: a given row being feasible, all 9 rows being feasible?
3. What is the probability of a column being feasible, given that all the rows are feasible?
4. What is the probability that row 4 from the top is feasible given that the top left box is feasible? What is it if you're given that the central box is feasible?
5. Can you bound on the probability that the entire grib has been filled feasibly? Can this bound then be used to upper bound the total number of sudoku grids possible?
6. If we add in the rule that the two long diagonals of the grid should contain all the digits from 1 to 9, what is the probability of getting a feasible filling of the grid?