For the extra credit problem, I used the “PreprocessBackTrackSolver” class to solve the problem. To use this solver, we will use PBTS in the main. If we want to switch back to the basic back track solver, use BBTS as input to the solveSudoku function. Main class shown below:

public static void main(String[] args) {  
 InputOutput io = new InputOutput(args[0]);  
 int[][] board = io.getBoard();  
 // Basic Back track solver  
 SudokuSolver BBTS = new BasicBackTrackSolver(board.length);  
 SudokuSolver PBTS = new PreprocessBackTrackSolver(board.length);  
 io.outputSolution(*solveSudoku*(board, PBTS));  
}

In addition, on my computer the program spent roughly 270,000 ms on solving the sample 16\*16 sudoku, which is around 5 minutes.

For the 25\*25 Killer sudoku, since the solver was able to solve it immediately after preprocessing, it took around 90ms.

For 25\*25 P1 and 36\*36 sudoku, the solver cannot solve it.