Optimization of beam weight, wedge angle and beam direction in treatment planning was studied. The optimization was done by minimizing a score function, which was a sum of weighted squares of differences between the calculated dose and the desired dose. The score also included terms for both dose and dose volume constraints for critical organs. Optimization of beam wedge angle was based on the fact that an open field superimposed with a wedged field can be described by another wedged field with an effective wedge angle. For each beam direction, an open field and a wedged field with the largest wedge angle allowed for that field size were used to start the optimization process. A simple scheme was used to choose one set of the wedged beams that gave the best score. In optimization of beam direction, many local minima may be present. Simulated annealing method was employed to avoid trapping the solution in a local minimum. The computer time required was from a few seconds for beam weight only optimization to about an hour for beam direction optimization. Treatment planner's standard plans were used as bench marks for comparison of the results. In terms of the dose distributions and DVHs, the optimized solutions were comparable or better than the planner's plans.