1. (4 points) Answer the following questions based on the presentation “Building A Smarter Healthcare System”:
   a. (2 points) List 3 IE tools that the healthcare system may use for improving the current system. Give an example of the application of each tool.
   b. (2 points) The presentation shows the use of 3 IE tools to solve the “Urgent Care Patient Forecasting and Staffing Optimization” case. To which of these 3 tools result, the system outputs are more sensitive? Explain.

2. (7 points) Answer the following questions based on the presentation “Optimization in Intensity Modulated Radiation Therapy (IMRT)”:
   a. (5 points) Following the notations of the presentation, please formulate the optimization problem with the objective to minimize the dose received by the critical voxels. Please write down the objective function and all the constraints considered in the presentation.
   b. (1 point) Why does the presentation recommend a scoring approach in the beam angle selection instead of solving the entire optimization problem?
   c. (1 point) We have seen in class that one row of 3 beamlets leads to 6 possible shapes for consideration. If there are 4 beamlets per row, how many shapes should the optimization problem consider?

3. (3 points) Answer the following questions based on the presentation “Debris Management Operations”:
   a. (1 point) The presentation considers 3 different network shapes, why is the solution time for the problems on the complete grid network longer than the solution time of the incomplete grid network?
   b. (2 points) What is the method recommended in the presentation to prioritize the connection of some zones over the others? What is the condition that makes this method work?

4. (3 points) Answer the following questions based on the following paper:
   EK Lee, S Maheshwary, J Mason, W Glisson, “Large-scale dispensing for emergency response to bioterrorism and infectious disease outbreak”.

NOTE: In answering these questions, do not copy-paste text from the articles. Use your own words.
5. (4 points) Answer the following questions based on the presentation “Catch-up Scheduling for Childhood immunization”

a. (2 points) Explain the motivation behind each term of the objective function (Page 10 of the presentation, slide number 20). Should we maximize this objective function or minimize it?

b. (2 points) What kind of dominance relationship exists between the following three schedules? Explain.

Note: If you want to submit your homework electronically, please send it to ytlee1@gatech.edu. If you want to submit a hardcopy, please bring it to class.