MIE1623: Healthcare engineering
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Assignment 3: Surgical scheduling

Contents

1 Problem description

Hospital Xena has planned a slate of 30 patients to be operated on next week, but the operating room (OR) manager has been unable to devise an acceptable surgical schedule that fits all the patients into the two available ORs. Your job is to devise mathematical model that optimally determines which patients should be operated on in which ORs on which days of the week. Assume there are enough surgeons, nurses, and equipment to accommodate any schedule that fits into the ORs.

2 The data

Data file `Xena_ScheduledSurgeries.xlsx`

Contents Metrics for each hospital

The data file contains a list of the scheduled patients, as described in Table 1. Hospital Xena's costs are given in Table 2. The ORs can be open at most from 8am to 3pm on Monday through Friday. The remaining OR time is used for emergency surgeries.

3 Questions

Submit your Excel files and a brief PDF report that analyzes your findings and answers the following questions:

1. How many variables and constraints does your model have? Distinguish between discrete and continuous variables.
2. How long does it take your model to find a solution?

Table 1: `Xena_ScheduledSurgeries.xlsx` data description

Column name	Information
Patient ID	Patient identifier
OR Time	Total required operating room time in minutes (includes preparation, surgery, and cleaning)

Table 2: Hospital Xena costs

Item	Cost
Cost of opening an OR	$1400
Hourly cost of running an OR	$500
Cost of a canceled surgery	$75
Hourly cost of overtime	$155

3. What is the total cost of next week's schedule?
4. How many patients are canceled, and what are the total cancelation costs?
5. How many hours are overtime, and what are the total overtime costs?
6. Are there any days in which an OR is not used?
7. Display the resulting schedule in a spreadsheet. You will be graded on clarity and aesthetics.