(Group 6)
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Problem 3-24 : *Waiter Scheduling :* For this problem, you will need to use Exel's VLOOKUP command. See the Exel Appendix for details of VLOOKUP. A certain restaurant operates 7 days a week. Waiters are hired to work 6 effective hours per day. The restaurant attracts individuals and small groups, which we will can regular demand. In addition, the restaurant attracts a number of larger groups (Rotary, Lions, Quarterback Club etc.) that schedule weekly meetings. The union contract specifies that each waiter must work 5 consecutive days and then have 2 consecutive days off. All waiters receive the same weekly salary. The minimum required waiter hours is a function of the regular daily demand plus the waiter hours needed to staff the scheduled group meetings for the day. The regular daily demands (in waiter hours) and the number of the group meetings currently scheduled each day are given in the following table.

DAY	REGULAR DAILY DEMAND (WAITER HOURS)	SCHEDULED LARGER GROUP MEETINGS
Monday	125	1
Tuesday	200	0
Wednesday	350	1
Thursday	300	0
Friday	650	3
Saturday	725	4
Sunday	250	2

The manager uses the following table to determine the waiter hours required for the larger group meetings. The manager would like to find an employment schedule that statisfies required waiter hours at a minimum cost. Assume that this cycle repeats indefinitely, and ignore the fact that the number of waiters hired must be an integer. Because demand may change from time to time, the spreadsheet model should be constructed in such a way that all the data are entered directly into their own cells. The spreadsheet should represent the appropriate LP for any set of these data. Optimize the spreadsheet for the data presented.

NUMBER OF GROUP MEETINGS PER DAY	WAITER HOURS NEEDED
0	0
1	24
2	36
3	52
4	64
5	80

Solution of the problem :

We defined th variables as follows:

XW_i : number of waiters who start their work on ***i.*** day of the week.*(monday = 1)*

Then the model is

Min : $XW_1 + XW_2 + XW_3 + XW_4 + XW_5 + XW_6 + XW_7$

s.t

$6*(XW_1 + XW_2 + XW_3 + XW_4 + XW_5) \geq 702 \geq 650 + 52$ (friday's need)

$6*(XW_2 + XW_3 + XW_4 + XW_5 + XW_6) \geq 792 \geq 725 + 64$ (saturday's need)

$6*(XW_3 + XW_4 + XW_5 + XW_6 + XW_7) \geq 288 \geq 250 + 36$ (sunday' need)

$6*(XW_4 + XW_5 + XW_6 + XW_7 + XW_1) \geq 150 \geq 125 + 24$ (monday's need)

$6*(XW_5 + XW_6 + XW_7 + XW_1 + XW_2) \geq 204 \geq 200$ (tuesday's need)

$6*(XW_6 + XW_7 + XW_1 + XW_2 + XW_3) \geq 378 \geq 350 + 24$ (wednesda's need)

$6*(XW_7 + XW_1 + XW_2 + XW_3 + XW_4) \geq 300 \geq 300$ (thursday's need)

$XW_i \geq 0$

Note: The numbers which are written with blue color, can all divide by 6 without remaining. Because all waiters must work 6 hours a day.

Note: You can see the solution of the problem in group6_prob24.xls excel document by using the solver.