Final Version

Department of Mathematics and Statistics, KFUPM
Math-480 Semester-151 Major II

Maximum Marks: 40 Time Allowed: 90 minutes

Instructions:

Write clearly and legibly. You may lose points for messy work.

Show all your work. No points for answers without justification.

Calculators and Mobiles are not allowed.

Question #	Grade	Maximum Points
1		11
2		08
3		07
4		07
5		07
Total:		40

(1)(11 *points*) Solve by Dual Simplex Method

$$\begin{aligned} &Minimize \quad z = 2x_1 + x_2 \\ &\text{subject to} \\ &\qquad 3x_1 + x_2 \ \geq 3 \\ &\qquad 4x_1 + 3x_2 \geq 6 \\ &\qquad x_1 + 2x_2 \leq 3 \\ &\qquad x_1, x_2 \geq 0. \end{aligned}$$

(2)(08 *points*) Use the complementary slackness conditions to find the optimal solution of the following problem:

$$\begin{aligned} &\textit{Minimize} \quad z = 2x_1 + 3x_2 + 5x_3 + 2x_4 + 3x_5 \\ &\text{subject to} \\ &\qquad x_1 + x_2 + 2x_3 + x_4 + 3x_5 \ \geq 4 \\ &\qquad 2x_1 - 2x_2 + 3x_3 + x_4 + x_5 \geq 3 \\ &\qquad\quad x_1, x_2, x_3, x_4, x_5 \geq 0. \end{aligned}$$

(3)(07 *points*) Find the initial basic feasible solution of the following transportation problem by **Vogel's Approximation method.**

W.H F	W1	W2	W3	W4	Factory Capacity
F1	19	30	50	10	7
F2	70	30	40	60	9
F3	40	8	70	20	18
Req.	5	8	7	14	

(4)(07 *points*) Solve the following assignment problem.

	1	2	3	4
I	12	30	20	15
II	18	33	9	31
III	44	25	24	21
IV	23	30	28	14

(5)(07 *points*) The following table gives the optimal solution of a LPP.

C_b	x_b	b	x1	x2	x3	s1	s2	s3
5	x_2	50/41	0	1	0	15/41	8/41	-10/41
4	x_2	62/41	0	0	1	-6/41	5/41	4/41
3	x_2	89/41	1	0	0	-2/41	-12/41	15/41
		765/41	0	0	0	45/41	24/41	11/41

How much C_3 can be increased before the present basic solution will no longer be optimal. Also, find the change in the solution of objective function, if possible.