MATH381

test #2, 10/20/16

Solutions

Total 100

Show all work legibly. **Name**:______________________

1. (40) Solve the LP problem

$$\max \mathbf{c}^T\mathbf{x} = 6x_1 + x_2 + 4x_3 \text{ subject to } 3x_1 + 7x_2 + x_3 \le 15,\ x_1 - 2x_2 + 3x_3 \le 20,\ \mathbf{x} \ge 0.$$

Solution.

	x_1	x_2	x_3	x_4	x_5	
x_4	3	7	1	1	0	15
x_5	1	-2	3	0	1	20
	-6	-1	-4	0	0	0
x_1	1	$7/3$	$1/3$	$1/3$	0	5
x_5	0	$-13/3$	$8/3$	$-1/3$	1	15
	0	13	-2	2	0	30
x_1	1	$33/8$	0	$3/8$	$-1/8$	$25/8$
x_3	0	$-13/8$	1	$-1/8$	$3/8$	$45/8$
	0	$39/4$	0	$7/4$	$3/4$	$165/4$

The solution is $x_1 = \dfrac{25}{8}$, $x_2 = 0$, $x_3 = \dfrac{45}{8}$, $z = \dfrac{165}{4}$.

2. (20) State the dual LP.

Solution.

$$\min \mathbf{b}^T\mathbf{y} = 15y_1 + 20y_2 \text{ subject to } 3y_1 + y_2 \ge 6,\ 7y_1 - 2y_2 \ge 1,\ y_1 + 3y_2 \ge 4, \mathbf{y} \ge 0.$$

3. (40) Solve the dual LP.

Solution. Applying the graphical method we get a feasible region with three extreme points which are listed below along with the value of the objective function:

y_1	y_2	z
1	3	75
$7/4$	$3/4$	$165/4$
4	0	60

4. (0) Compare results in 1 and 3 above.