MATH381

test #3, 12/01/16

Total 100

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

1. (30) Solve the LP problem

$$\max \mathbf{c}^T\mathbf{x} = 2x_1 + 4x_2 + 6x_3 + 2x_4 \text{ subject to } \mathbf{x} \geq 0,$$

$$\begin{array}{rcrcrcrl} x_1 & - & x_2 & + & 2x_3 & + & x_4 & \leq 1 \\ -2x_1 & + & x_2 & + & & + & x_4 & \leq 2 \\ x_1 & + & x_2 & + & x_3 & + & x_4 & \leq 1 \end{array}$$

The optimal solution is: $x_1 =$, $x_2 =$, $x_3 =$, $x_4 =$.

2. (20) State the dual LP, and provide its solution.

The optimal solution is: $\mathbf{y} =$

3. (20) Add an additional constraint $x_1 + 2x_2 + 2x_3 + x_4 \leq 2$ to LP problem above, and solve it.

The optimal solution is: $x_1 =$, $x_2 =$, $x_3 =$, $x_4 =$.

4. (30) Find the values $c_1^{'}$ for the cost functional $c_1^{'}x_1 + 4x_2 + 6x_3 + 2x_4$ so that the LP problem in question 1 above has the same optimal solution with $\mathbf{c} = (2, 4, 6, 2)$ and $\mathbf{c}^{'} = (c_1^{'}, 4, 6, 2)$.

The values for $c_1^{'}$ are: