Homework Chapter III

1.
1.   Joe has a small factory in which he makes three types of toys - fine, fancy and super. Joe seeks to determine the amount of each toy he should make so as to maximize net returns.

The scarce resources Joe must allocate are 10 board feet of lumber and 75 hours of labor. From previous experience, Joe has developed the following information:

	Fine	Fancy	Super
Lumber Use (bd. ft.)	1.4	1.25	0.8
Labor Use (hours)	4	5	2.5
Net Return ($)	36	44	18

a.   Formulate a linear programming model for Joe's firm.
b.   Write the dual to the problem formulated in part a.
c.   Give an economic interpretation of
   1) The dual variables
   2) The dual objective function
   3) The dual constraints
c.   Interpret at least 2 elements from the numerical counterparts of each the following terms at optimality

   i. $C_B B^{-1}$
   ii. B^{-1}
   iii. $B^{-1} b$
   iv. $C_B B^{-1} b$ (one element only)
   v. $C_B B^{-1} A_{NB} - C_{NB}$

d.   Do a cost range on
   i.   Obj Coefficient of a the first basic variable
   ii.   Obj Coefficient of the first non basic variable
   iii.   Obj Coefficient of the first basic and the first non basic simultaneously
         (Where coefficients change by equal amounts)

e.   do a RHS range on

   i.   1st constraint
   ii.   2nd constraint
   iii.   both constraints together
               (Where RHS coefficients change by equal amounts)