

AGEC 622- LP  
Homework #2 Answer Key

1. Vans

Decision Variables	Fine	Fancy	New	Sum		RHS Limit
Change	8.2	2.8	1			
Objective to max	2000	1700	1200	22360		
<b>Constraints</b>						
Max Vans	1	1	1	12	LE	12
Labor	25	20	20	281	LE	281
New Van Req.			1	1	GE	1

The original objective function value was \$22,800, while the new one is \$22,360. In the new formulation we increased labor by one unit, while forcing one unit of new vans into production. Labor had a shadow price of \$60 and new vans had a reduced cost of -\$500. Thus, we should expect a net change in our objective function of -\$440. The difference in \$22,800 and \$22,360 is in fact -\$540. By knowing the shadow prices and reduced costs we can determine what will happen to the optimal objective function if we change our resource endowments and/or the variables that we want in our final model.

2. Transportation

Decision Variables	1 A	2 A	3 A	1 B	2 B	3 B	Sum		RHS Limit
Change	(0.00)	150.00	200.00	500.00	150.00	-			
Objective to Min	16	25	10	6.25	17.5	17.5	11,500.00		
<b>Constraints</b>									
Inventory 1	1			1			500.00	LE	500
Inventory 2		1			1		300.00	LE	300
Inventory 3			1			1	200.00	LE	200
Demand A	1	1	1				350.00	GE	350
Demand B				1	1	1	650.00	GE	650

3. Feed Problem

Decision Variables	Hog Scraps	Cow Scraps	C. Fiber	Sum		RHS Limit
Change	-	1.00	0.00			
Objective to Min	65	40	12	40		
<b>Constraints</b>						
Fat		30	24	5	24	LE 27
Protein		29	29	9	29	GE 23
Taste		28	20	2	20	GE 20
Volume		1	1	1	1	E 1

4. Discuss each of the following assumptions in relation to one of the above problems:  
a. Objective Function Appropriateness

- b. Decision Variable Appropriateness
- c. Constraint Appropriateness
- d. Proportionality
- e. Additivity
- f. Divisibility
- g. Certainty

5. Portfolio

Data					
Obs	X1	X2	X3	X4	
1	45	45	65	30	
2	60	70	38	31	
3	18	18	70	35	
4	5	42	92	28	
5	52	15	20	18	
6	60	40	15	28	
7	41	30	17	40	
8	16	19	66	12	
Mean	37.125	34.87500	47.875	27.75	
Max	60	70	92	40	
Min	5	15	15	12	
<b>&lt;Tools-Data Analysis-Covariance&gt;</b>					
Covariance Matrix					
	X1	X2	X3	X4	
X1	398.609375	139.390625	-450.109	23.28125	
X2		296.109375	1.984375	50.21875	
X3			745.8594	-27.7813	
X4				70.1875	
<b>S Matrix: "Variance-Covariance Matrix"</b>					
	X1	X2	X3	X4	
X1	398.609375	139.390625	-450.109	23.28125	
X2	139.390625	296.109375	1.984375	50.21875	
X3	-450.109375	1.984375	745.8594	-27.7813	
X4	23.28125	23.28125	-27.7813	70.1875	
<b>MAX [37.125 34.88 47.25 27.75]</b>	<b>X1</b>	<b>X2</b>	<b>- Φ</b>	<b>[X1 X2 X3 X4]</b>	<b>398.61 139.39 (450.11) 23.28</b>
	<b>X3</b>				<b>(450.11) 1.98 745.86 (27.78)</b>
	<b>X4</b>				<b>23.28 23.28 (27.78) 70.19</b>
					<b>X1 X2 X3 X4</b>
<b>s.t.</b>	<b>200 X1 + 200 X2 + 200 X3 + 200 X4</b>				<b>≤ 200000</b>
	<b>X1 , X2 , X3 , X4</b>				<b>≥ 0</b>
Decision Variables	Stock1	Stock 2	Stock 3	Stock 4	
Change	2.50	-	1.90	1.90	Sum RHS
Objective: Max E- Φ Variance					118.32
Expected Value	37.125	34.875	47.875	27.75	236.64
Rap*Var					118.32
Avail. Of Funds	200	200	200	200	1,260.65 < 200,000
Purchases	1	1	1	1	6.30 > 0
RAP					0.1
X'S	185.6251028	396.7592158	239.3748	138.75	
X	2.502036559				
	0				
	1.901616428				
	1.899608311				
X'SX	1183.210596				