Linear Programming, Computer solution - Product mix and sensitivity analysis

Molly's Fruit Pies can sell three products: Apple pies, sweet cherry rolls and fried funnel cakes without fruit. Profits are $3.50, $4.50, and $2 for apple, cherry and funnel cakes, respectively. Limiting resources are flour, sugar, oil, apples, cinnamon, & cherries. The amounts--in pounds-- used for each unit of each product is shown in the table. Oscar Optimizer, the corner operations scientist, has analyzed this situation using linear programming, and given a simplified computer printout to Molly so that she can figure out how much of each product to make to maximize her profit and make the best use of her resources. The computer printout is on page 5 of the exam. Assume Molly would use the data and that you can be sure of what she would do up to the limits on the ranges of validity and optimality. Please feel free to rip off the output to aid interpretation.

A) What is the optimal production plan and how much profit would Molly make?

B) How much more would Molly have to get for funnel cakes to make it worth her while to change the plan?

C) Suppose someone offered Molly 50 cents per pound for Cherries? How many pounds are you sure she would sell?

D) Suppose someone offered Molly 50 cents per pound for apples? How many pounds are you sure she would sell?

E) How much would Molly have to charge for cinnamon to make it worthwhile selling some?

F) How low could the price on funnel cakes go before Molly would change her plan?

G) If everything else remained the same, how profitable would Apple pies have to be to get Molly to change the plan?

H) How much cinnamon are you sure Molly would buy if the price were just below $7/pound?

Computer Printout--the model

	Apple pie	Cherry Roll	Funnel Cake		RHS=Available
Unit Profit-->	3.5	4.5	2		
constraint					
Flour	1	2	4	<=	2,000
Sugar	1	5	2	<=	3,000
Oil	1	1	3	<=	1,500
Apples	3	0	0	<=	1,000
Cinnamon	0.5	0.1	0.3	<=	70
Cherries	0	7	0	<=	1,000

Computer Printout--Range of Optimality for Objective Function Coefficients

	Value	Current Coefficient	Lower Limit	Upper Limit
Variable				
Apple Pie	111.43	3.5	3.33	22.5
Cherry Rolls	142.86	4.5	0.7	Infinity
Funnel Cake	0	2	-infinity	2.1

Objective Function Value = 1032.85717

Computer Printout--Range of Validity for Shadow Prices

	RHS	Slack	Shadow Price	Lower Limit	Upper Limit
Constraint					
Flour	2,000	1,602.86	0	397.14	Infinity
Sugar	3,000	2,174.29	0	825.71	Infinity
Oil	1,500	1,245.71	0	254.29	Infinity
Apples	1,000	665.71	0	334.29	Infinity
Cinnamon	70	0	7	14.29	180.95
Cherries	1,000	0	0.54	2	4,170.83