

Name: ANSWER KEY

Score: _____

Consider the following linear programming problem:

A vendor plans to operate a stand at a one-day fair at which he will sell bags of peanuts and bags of candy. He has \$400 available to purchase his stock, which will cost 40¢ per bag of peanuts and 80¢ per bag of candy. He intends to sell the peanuts at \$1.00 and the candy at \$1.60 per bag. His stand can accommodate up to 500 bags of peanuts and 400 bags of candy. From past experience he knows that he will sell no more than a total of 700 bags. Find the number of bags of each that he should have available to maximize his profit.

DO NOT SOLVE THE PROBLEM, but answer the questions below.

- a. (4) What is the objective function?

$$P = .6p + .8c$$

- b. (6) List the constraints.

$$\begin{cases} 0 \leq p \leq 500 \\ 0 \leq c \leq 400 \\ p + c \leq 700 \\ .4p + .8c \leq 400 \end{cases}$$

ANALYSIS:

	Cost/bag	selling price/bag	Capacity (bags)	Cost	Income
peanuts	\$.40	\$1	500	\$.4p	\$1p
candy	\$.80	\$1.60	400	\$.8c	\$1.6c
TOTAL	—	—	700	\$400	

$$\text{Profit} = \text{Income} - \text{Cost}$$

$$\text{Income} = \text{income from peanuts} + \text{income from candy}$$

$$= p + 1.6c$$

$$\text{Cost} = \text{cost of peanuts} + \text{cost of candy} = .4p + .8c$$

$$\therefore \text{Profit} = (p + 1.6c) - (.4p + .8c) = .6p + .8c$$