

9(7) A book binder makes three types of bindings: Paperback, Book club, and Library. Each type must be sewed and glued. The table gives the time required. The bottom line gives the profit he makes with each type.

	Paper	Club	Library
Sewing	2 min	2 min	3 min
Gluing	4 min	6 min	10 min
Profit	\$.50	\$.80	\$1.20

The man that does the gluing works at most 7 hours (420 minutes).

The sewing lady works at most 10 hours (600 minutes).

Let p, b, r = the number of paperback, book club, and library books.

How many books of each type must he make to maximize profits?

$p = \underline{\hspace{2cm}}$ $b = \underline{\hspace{2cm}}$ $r = \underline{\hspace{2cm}}$

What is the marginal value of an hours worth of sewing?

If the glue man is paid according to the profit he generates, how much should he be paid per hour?

A part-time employee wants to work an hour a day.

Should she (circle one) *glue* or *sew*?

4(6) A farmer grows c acres of corn, s acres of soybeans, and t acres of oats. How many acres of each crop should be planted to maximize profits. Each crop has the following capital and labor requirements and profit.

	Labor	Capital	Profit
c : Corn / acre	6 hr	\$36	\$40
s : Soybeans / acre	6 hr	\$24	\$30
t : Oats / acre	2 hr	\$18	\$20

Let a = the number of acres planted,

p = the capital in dollars

h = the number of hours worked.

z = profit.

There are 12 acres of land available.

There is \$360 of capital.

There are 48 hours of labor available.

How much will the profit change (use negatives to indicate a decrease) if

a is increased by 1 acre? _____

p is increased by \$10? _____

h is decreased by 1 hour? _____

Which, if any, resource (circle one) is not fully used?

a p h

How much is unused? _____

If the farmer wishes to lease his land, what is the minimum

amount he should charge for an acre? _____

3(7) Smith makes lamps and flower pots. Jones paints the lamps; the pots don't need paint. It takes Smith 1 hour to make a lamp; 3 hours to make a flower pot. Jones takes 2 hours to paint a lamp. Smith can work at most 2 hours a day; Jones can work at most 7 hours. The lamps and the pots both sell for \$30 each. How many lamps and how many pots should be made per day for maximal total sales?

Build a mathematical model of the above problem and solve it.

If Smith wants to work an additional hour and if you pay him according to the amount of additional revenue he generates, how should you pay him for the added hour?

If Jones wants to work an additional hour and if you pay him according to the amount of additional revenue he generates, how should you pay him for the added hour?

How much can Smith reduce his work load without changing the solution (i.e., the values of the primal variables)?

How much can Jones reduce his work load without changing the solution?