

Directions: The Copy Cat Brewery has engaged your services as a business consultant. You have been asked to assess potential production models for the brewery and to provide a suggested production strategy to maximize monthly profits. Use the data provided below to perform your analysis.

Your write up of this problem must include two components: first, a business letter addressed to the owners of CCB which outlines the optimal production strategy and addresses the owners' concern raised in Question 3. Second, a formal presentation of the model solved using the 5-step method needs to be included as an appendix to the letter.

The Copy Cat Brewery

CCB sells three craft beers by the 16oz. bottle. The beers are an ale, a lager, and a stout. To make beer, water, malted barley, hops, and yeast are used in different proportions depending on the particular variety. For a 1-gallon-yield, the following amounts are required:

	Ale	Lager	Stout
Water (gals)	1.250	1.100	1.300
Malted Barley (lbs)	2.250	1.222	3.233
Hops (lbs)	0.045	0.011	0.022
Brewer's yeast (pkgs)	0.157	0.185	0.172
Yield (gals)	1.000	1.000	1.000

Note that the recipes scale linearly so for 100 gallons of Ale, 125 gallons of water would be needed.

Once a gallon has been cooked and fermented, it can be bottled and sold. Estimated revenue per gallon is:

	Revenue (\$/gal)
Ale	38.00
Lager	26.00
Stout	40.50

The costs associated with the brewing process, as well as the availability of the necessary resources, are detailed below:

	Cost	Availability
Water (gal)	\$.45	2000 gals/month
Malted Barley (lb)	\$ 2.50	1400 lbs/month
Hops (lb)	\$ 3.75	50 lbs/month
Brewer's Yeast (pkg)	\$ 6.00	150 pkgs/month

1. CCB currently produces 100 gallons of Ale, 400 gallons of lager, and 200 gallons of stout each month. However, CCB feels that it can do better. What production plan maximizes monthly profit? Use a linear programming model to answer this question. You cannot brew fractions of gallons.
2. Determine and interpret the shadow price of any binding constraint discovered by your model.
3. The Two Dog Brewery down the road usually has a surplus of barley at the end of each month. They've asked whether or not CCB would be interested in purchasing the surplus under the following conditions: if CCB agrees to buy ALL 600 pounds of their surplus at \$7.50 per pound, they will throw in another 5 packages of yeast as well. Is this deal worth it?

Be careful when figuring out the profit function.