Name: _____KEY_____

100 point total, answer all questions in the space provided.

1. (15 pts.) From the *WSJ* (4/18/13): "A Bumper Crop and Chinese Go Nuts": A stream of Chinese nationals have descended on southern Georgia, looking to buy peanuts. Exports to China are expected to reach record levels. This is the result of cheap prices for peanuts after a record crop last year—up 84% over 2011 when 3.6 billion pounds were harvested in the U.S. Prices have fallen from $0.70 to $0.45 cents per pound.

(8 pts) a) Illustrate these events in the diagram below.
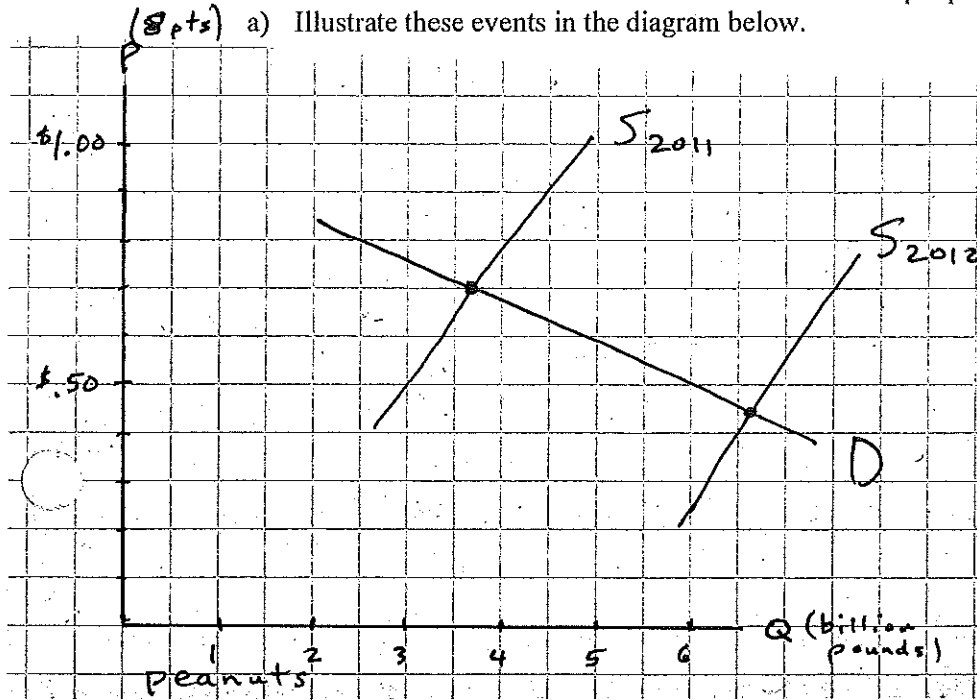
$Q_{2011} = 3.6\ b$

$Q_{2012} = 1.84 * 3.6$

$\qquad = 6.6\ b$

$P_{2011} = \$.70$

$P_{2012} = \$.45$

(7 pts) b) Calculate own-price elasticity of demand for peanuts.

$$\mathcal{E}_{x, P_x} = \frac{\%\, \Delta Q_x}{\%\, \Delta P_x} = \frac{84\,\%}{\%\,\Delta P_x}$$

$$\%\, \Delta P_x = \frac{70-45}{70} = \frac{25}{70} = 36\,\%$$

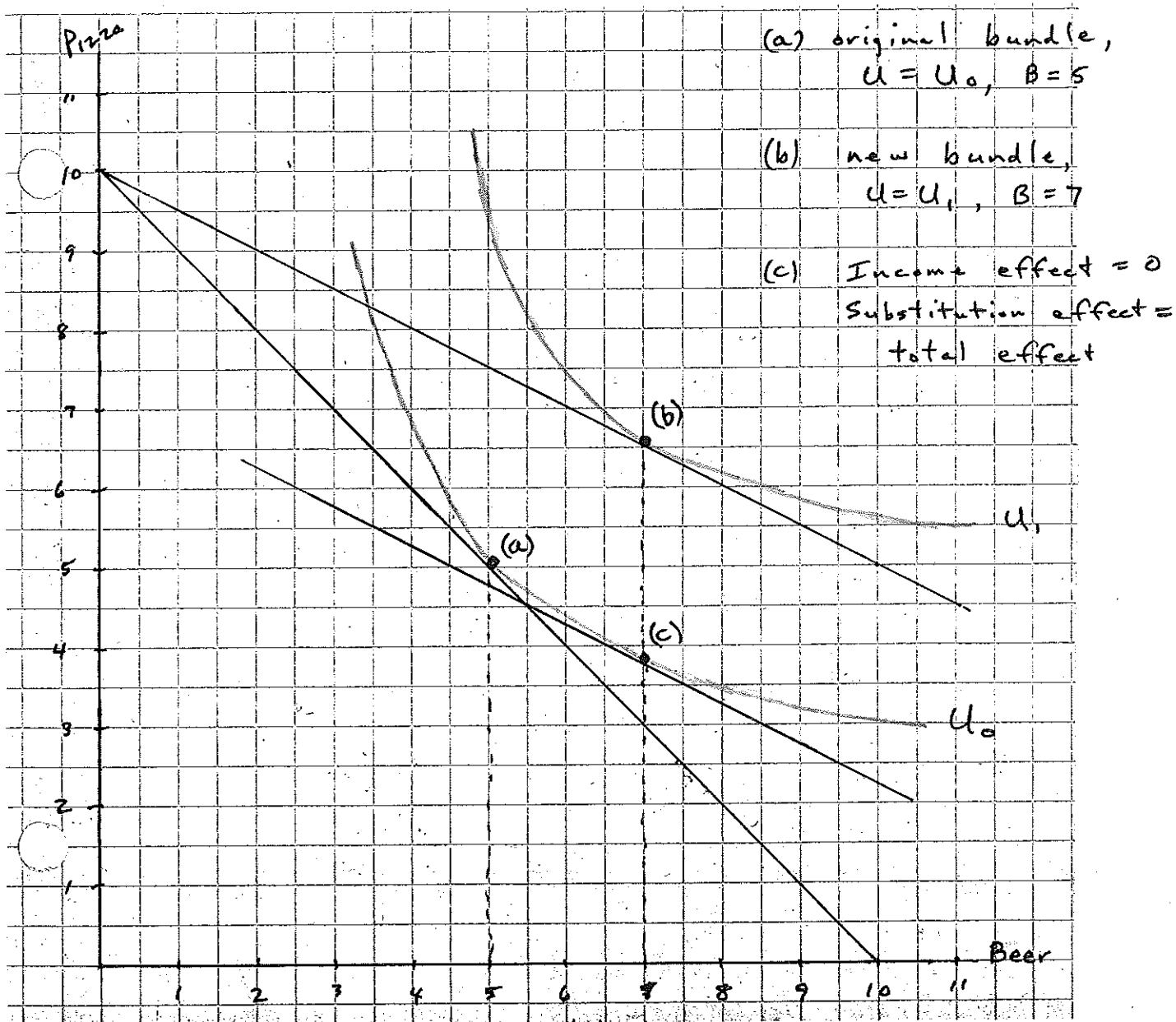$$\mathcal{E}_{x, P_x} = \frac{84\,\%}{36\,\%} = 2.33$$

2. (20 pts.) Homer finally gets fired from his job once and for all. His spirit broken, he sits around the house all day and does nothing. His wife Marge decides that she will earn money by taking in and doing other people's laundry. As a result of her labor, the household's income is $600 per month. Under these conditions, the Simpson family chooses to consume 150 units of food (P_F = $1.00 per unit) and 450 units of other goods (P_{OG} = $1.00 per unit).

10

a) Illustrate the Simpsons' initial situation with a budget-constraint and indifference-curve diagram. [Hint: Read part (b) before you draw your indifference curve.]

10

b) Suppose the Simpsons qualify for a food stamp program whereby they are given the option of spending $300 in cash income on coupons that can be redeemed for 400 units of food, but that cannot be used to purchase other goods. The Simpsons decide **not** to participate in the program and continue to consume F=150 and OG=450. Illustrate the effect of the food stamp option on their budget constraint and explain why they don't purchase the food stamps by drawing another of their indifference curves.
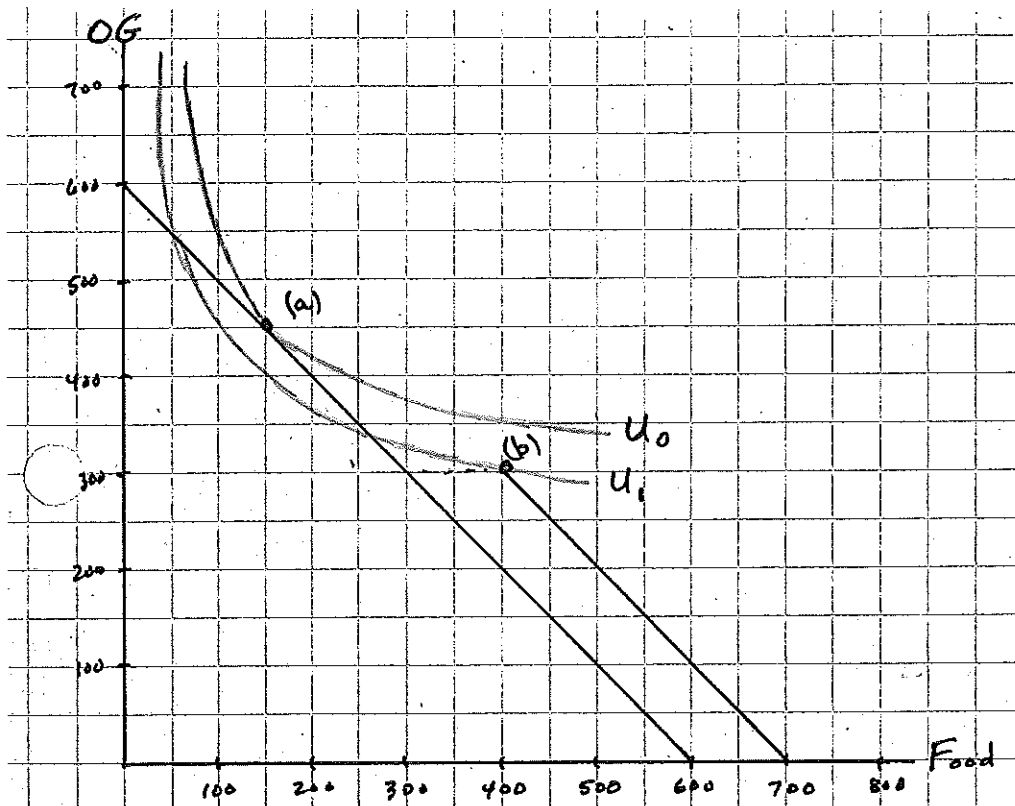
(a)   as illustrated above

(b)   food stamp option results in shift outward of their budget constraint once food consumption reaches F = 300. They prefer ($u = u_0$) their original consumption bundle (a) to that possible by buying food stamps (b), where $u = u_1$.

3. (15 pts.) Bart consumes two goods, beer and pizza. Bart's income elasticity of demand for beer is zero. Bart's monthly allowance from his parents is $100. When the price of beer is $10 per six-pack and pizzas are $10 apiece, he consumes five six-packs of beer per month. When the price of beer falls to $5 per six-pack (and the price of pizza stays the same), Bart increases his consumption of beer to seven six-packs per month. (a) Illustrate Bart's initial budget constraint and consumption bundle in the diagram below. (b) Then illustrate his new budget constraint and consumption bundle after the price of beer falls. (c) Finally, decompose the total change in his consumption of beer resulting from the price decline into its income effect and substitution effect components.

Pizza

(a) original bundle, $u = U_o$, $B = 5$

(b) new bundle, $u = U_1$, $B = 7$

(c) Income effect = 0
Substitution effect = total effect

(b)

u_1

(a)

(c)

u_o

Beer

Total
Subst

(a) as illustrated.

(b) as illustrated. $I = 0$

(c) $E_{beer, Income} = 0$, so the income effect is zero. The total effect of the price change is entirely a substitution effect.

4. (15 pts.) In 1987 the market price of a four-foot alligator was $180. Approximately 300,000 four-foot alligators were bought and sold at that price. Minimum efficient scale for a typical alligator farmer is 3000 alligators per year. At that scale of operation, average total cost equals $150.

a) Illustrate these supply and demand conditions in the market diagram below. Then illustrate the ATC, MC, and demand curves for a typical alligator farmer facing the 1987 market conditions. Show the firm's profit-maximizing output and its profits in your diagram.

b) Now imagine that you were asked in 1987 to predict the future of the industry. Given the 1987 market conditions, what do you think was likely to happen in the alligator market going forward? Your answer should contain references to short-run and long-run profits, the number of firms, and market price and output.
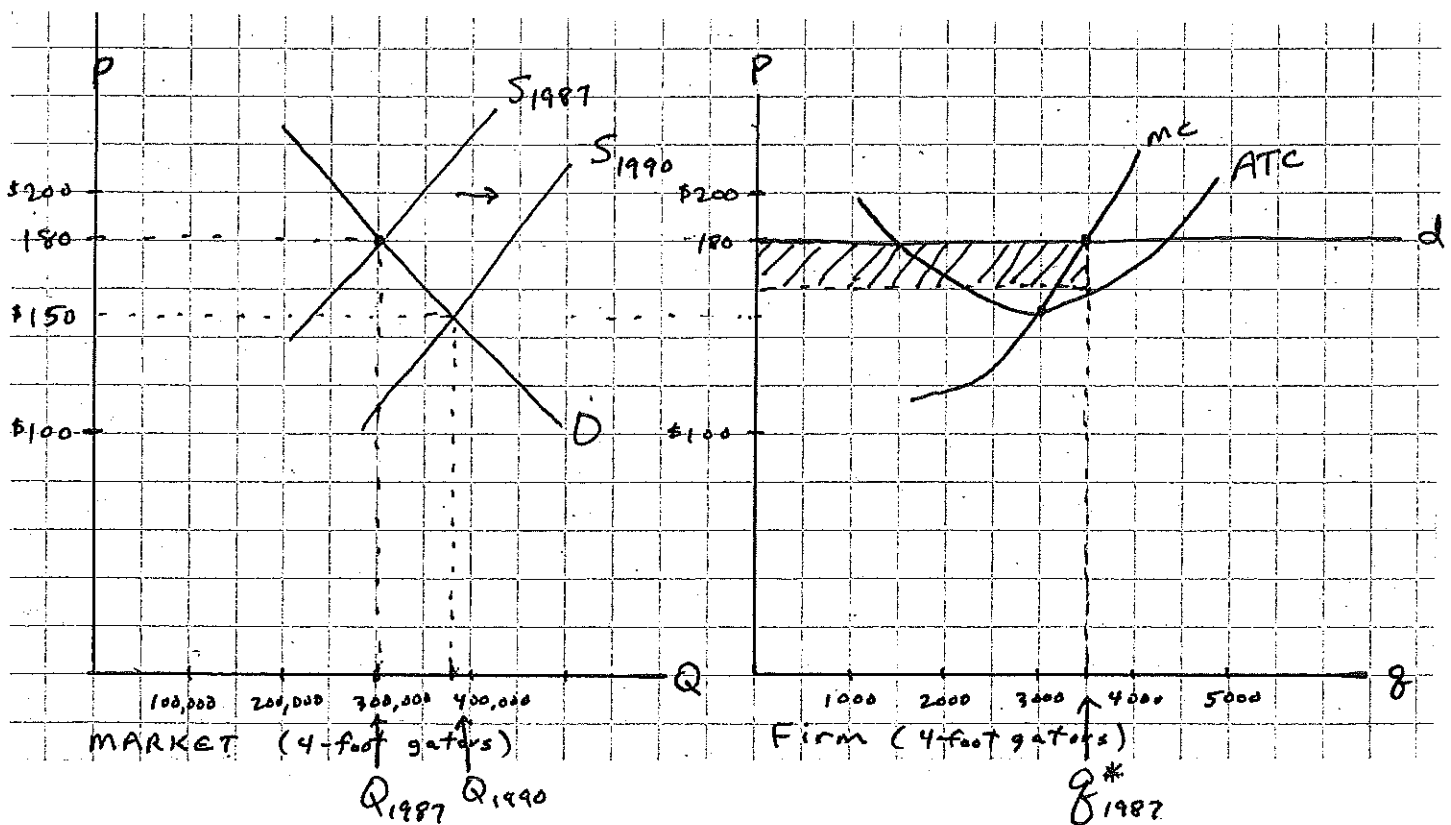

(a) as illustrated, Market price = $180, so firm's demand curve is perfectly elastic at that price. Firm's profit-maximizing output is where P = mc, and profits are positive.

(b) Positive economic profits attract new firms into the market. Market supply shifts to the right and market price falls. Expected long-run price = $150, or minimum LRAC. Expected long-run profits are zero, i.e. alligator farmers can expect to earn a normal return in the long run. Market output will be greater than 300,000, and there will be more alligator farmers.

5. (15 pts.) A firm has fixed and variable costs as given in the table below:

Q	0	2	4	8	12	16	18	20	21
TFC	200	200	200	200	200	200	200	200	200
TVC	0	160	240	320	360	440	520	680	840

The firm is a monopolist, and faces a market demand curve given by $P = 80 - 4Q$.

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a) Plot the firm's total revenue, TC, and TVC curves in the diagram below. To plot total revenue, just calculate TR for Q = 0, 2, 4, 8, 10, 12, 16, 18, and 20.

6

b) What output will maximize profit (minimize loss) in the short run? Show this output in the diagram and illustrate what the firm's profits (losses) will be at that output.

5

c) Bonus (5 pts.): Illustrate the MR=MC profit maximization condition in this diagram and briefly explain.
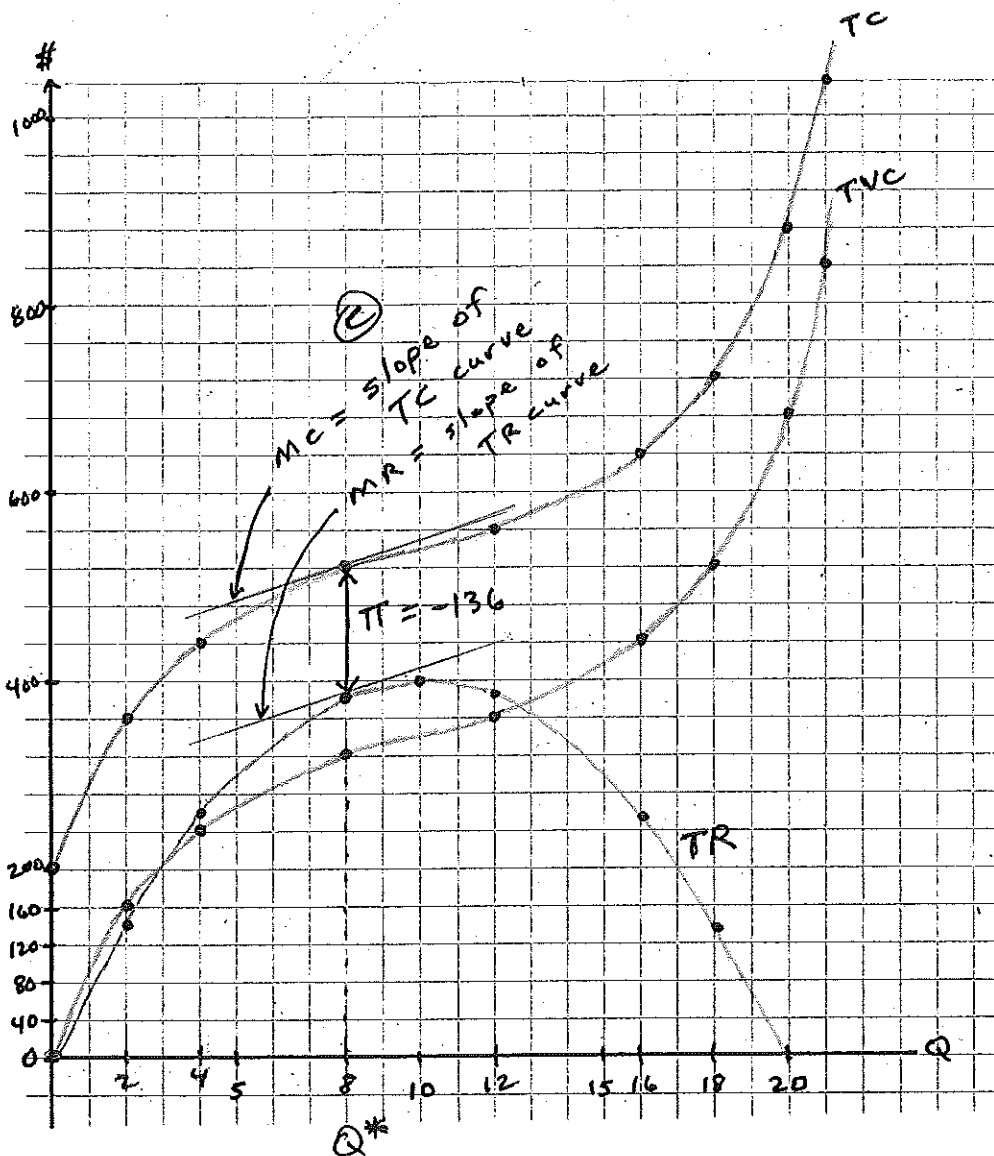
Q	P	TR	TC	π
0	80	0	200	-200
2	72	144	360	-216
4	64	256	440	-184
8	48	384	520	-136
10	40	400		
12	32	384	560	-176
16	16	256	640	
18	8	144	720	
20	0	0	880	

(a) as illustrated:
TC, TVC, TR

(b)

Q	TR	TC	π
0	0	200	-200
2	144	360	-216
4	256	440	-184
8	384	520	-136
12	384	560	-176
16	256	640	-388

(c) at profit max, MR = MC, or the slope of the TR function equals the slope of the TC function.

6. (10 pts.) Robinson Crusoe and Friday are currently using L and K in the production of coconuts such that $MRTS_{L,K} = 2K:1L$. They are currently using L and K in the production of fish such that $MRTS_{L,K} = 1K:2L$. Show their choices of L and K for coconuts and for fish in the diagrams below, i.e. show the points on the Q_c and Q_f isoquants where they are currently operating. Is this situation Pareto optimal? If not, explain how you could reconfigure the usage of L and K to make them better off.
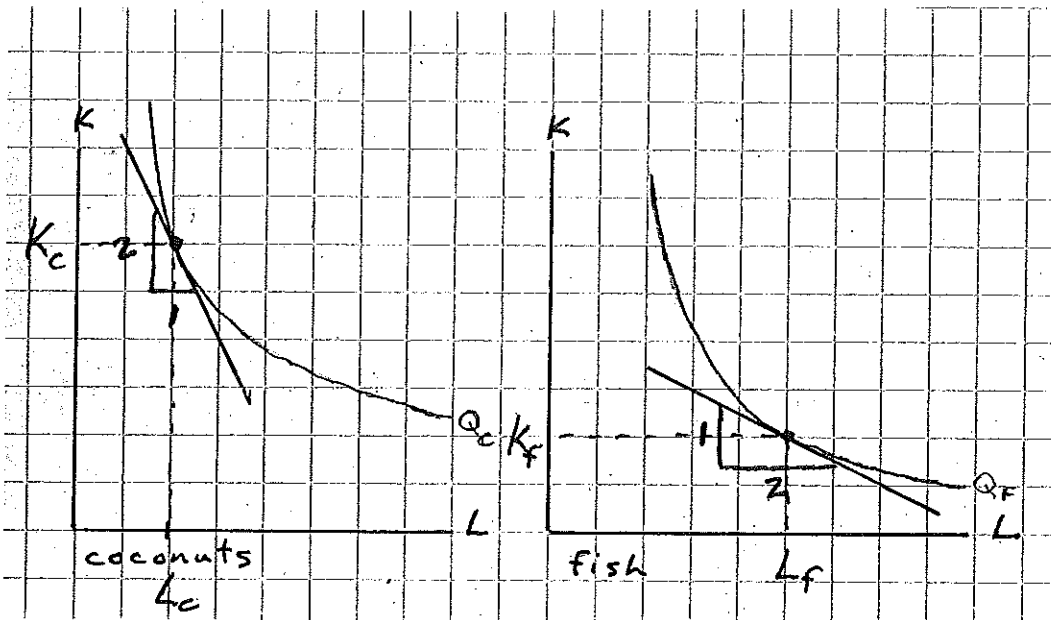
$$MRTS_{L,K} = \frac{2K}{1L}$$

at L_c, K_c

$$MRTS_{L,K} = \frac{1K}{2L}$$

at L_f, K_f

Production efficiency requires that

$$MRTS_{L,K} (coconuts) = MRTS_{L,K} (fish)$$

Since they are not equal, this situation is not Pareto optimal.

If you transfer one unit of labor from producing fish to coconuts, and transfer one unit of capital from producing coconuts to fish, you can increase the output of both coconuts and fish.

7. (10 pts.) International arms dealer Leonardo da Vinci pays Crusoe and Friday a visit on their island. He is selling trebuchets, which can hurl a 500 pound stone with accuracy and are effective in sinking pirate ships at a range of up to one-half mile offshore. Crusoe and Friday have been invaded before, and are interested in protecting their island from marauding pirates. Their individual demand curves which reflect their marginal willingness to pay for trebuchets are given in the table below:

Quantity of trebuchets:	1	2	3	4	5
Crusoe's WTP:	$70	$60	$50	$40	$30
Friday's WTP:	$60	$50	$40	$30	$20

Da Vinci is charging $100 apiece for his trebuchets. In the diagram below illustrate Crusoe's demand curve for trebuchets, and then illustrate Friday's demand curve for trebuchets. Then illustrate the social marginal benefit curve, and explain what the Pareto optimal number of trebuchets for them to buy is.
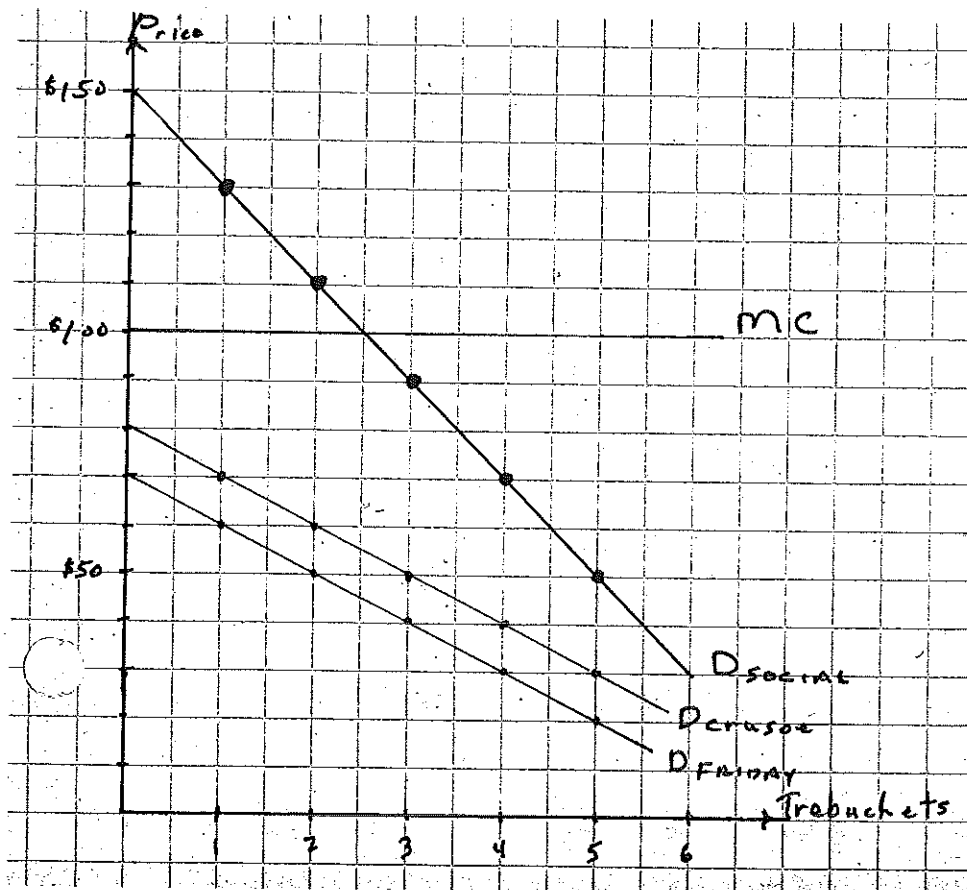
Trebuchets are non-rival in consumption and are non-excludable, so they are a public good.

Marginal benefits outweigh marginal costs for the first two trebuchets, but Crusoe's and Friday's joint valuation of a third trebuchet = $90 and is less than the marginal cost = $100, so they should stop at two.