Economics 370
Microeconomic Theory
Problem Set 1
Answer Key

1) *Bob has decided to go skiing for the weekend, but (absentminded professor that he is) he has forgotten his skis. He is considering three options: (1) stay indoors and read economics texts; (2) ski for two days and read economics texts one day; (3) ski for three days and forget economics. The costs of skiing are as follows:*

Transportation, $100; Lodging, $200; Ski pass, $20 per day; and Ski rental, $25 per day.

Bob has also found out that the resort has a special three-day pass including rental for $75. Assume that Bob has already reached the ski slopes and that he cannot cancel his room reservations.

a) What are the costs of the three options?

First, note that the costs of transportation and lodging are sunk and cannot be recovered. Also, when more than one means of doing the same thing is available, Bob will chose the means that costs the least. In particular, in skiing two days, he can choose to buy the three-day pass and ski two days (the pass does not come with an obligation to use it all three days). That leaves costs as:

Choice	Cost Description	Cost
Read Economics		$ 0
Ski two days	min{ 2 × (20 + 25), 75 }	75
Ski three days	min{ 2 × (20 + 25), 75 }	75

b) What is the cost of skiing a third day?

The additional cost of the third day of skiing is $0.

c) Suppose Bob figures it is worth about $30 a day for him to ski. What should he do?

Choice	Benefit	Benefit – Cost = Net Benefit
Read Economics	$0	$0
Ski two days	2 × 30 = $60	60 – 75 = $ -15
Ski three days	3 × 30 = $90	90 – 75 = $15

Bob will choose the option that gives him the greatest net benefit. He will ski all three days.

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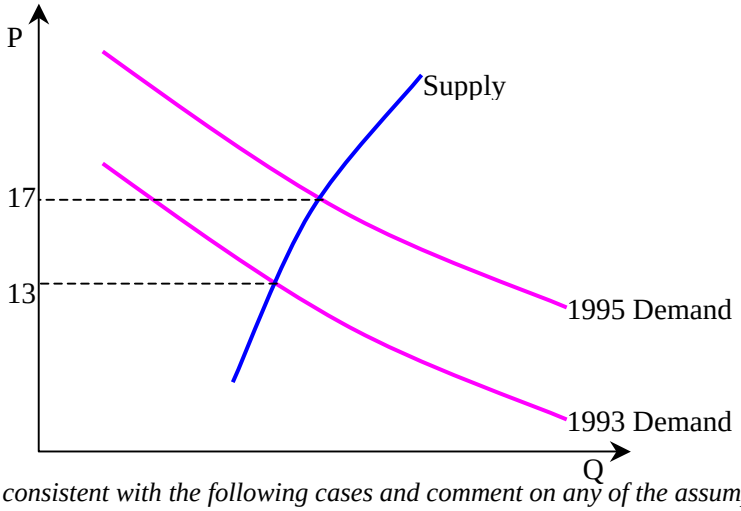
2) *In preparation for the 1996 Olympic Games, the city of Atlanta, Georgia, embarked upon a $500 million construction program. Brick masons who had earned $13 to $14 an hour in 1993 were commanding $17 to $18 in 1995. Use a supply and demand model to represent this situation.*

The most reasonable assumption is that the supply curve for brick masons did not change between 1993 and 1995. Demand, however, increased. This gives:

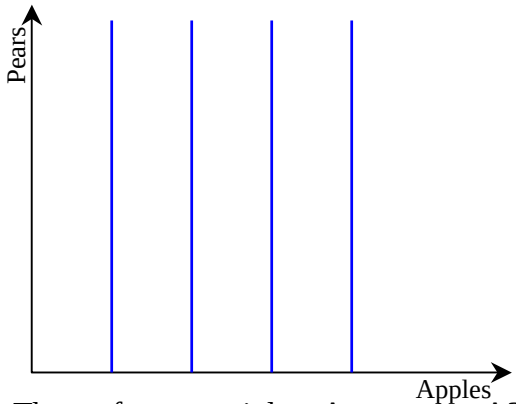


3) *Sketch indifference curves consistent with the following cases and comment on any of the assumptions A1 to A4 which are contradicted by the indifference curves you have drawn.*

a) John is willing to give away a cold beer in exchange for a dirty pair of old gym socks.

The preferences are strange, but perfectly consistent with our assumptions.

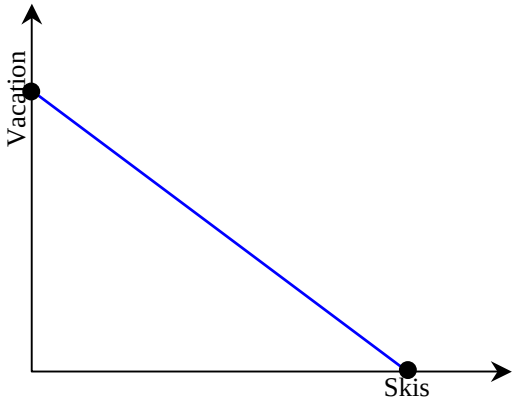
b) Eve likes apples but doesn't care about pears.



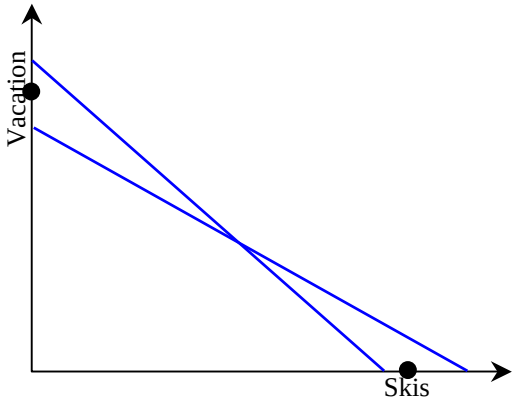
The preferences violate Assumption A3, Non-satiation, since more pears are not better.

c) Tom can't decide whether he would rather take his vacation in California or buy a pair of skis.

There are two ways to interpret this question. Either Tom can't decide because he is indifferent between the two:

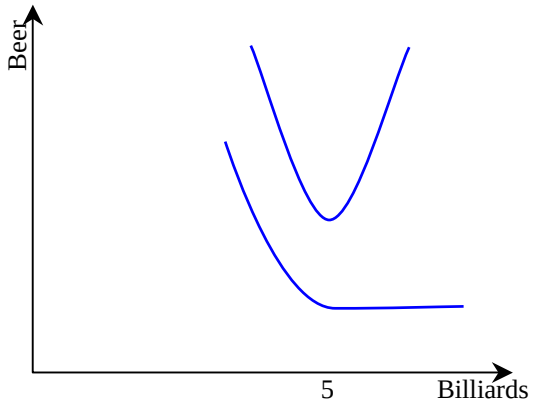


Or he can't decide because he violates assumption A1 (completeness): he can't figure out how to rank the two. The best way to draw that would be like this:



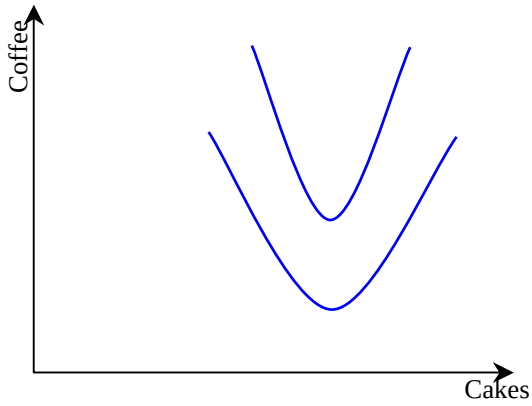
d) *Ray likes to play billiards and drink beer. But after playing five games of billiards, he doesn't want to play any more.*

This violates non-satiation. More billiards is not better. Two possible forms of the indifference curves are shown below. In the second, more is not better, but it is not worse either.



e) *An individual consumes two goods, coffee and cake. More coffee is always preferred. If the individual has few cakes, more cakes are preferred but after some point additional cakes subtract from utility.*

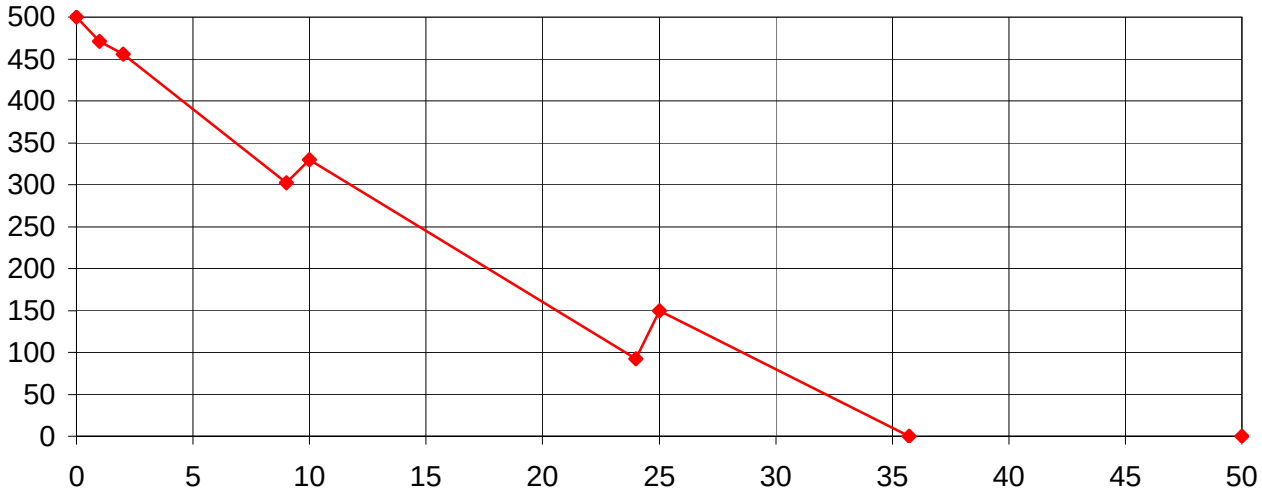
This violates non-satiation. More cakes are not better.



4) *WinZip used to have the following price schedule for site licenses (further below). If the total amount your organization has to spend is $500, graph your budget constraint for WinZip site licenses and the composite good.*

Size From	Size To	Price / License	Min Expenditure	Max Expenditure
0	1	$29.00	0	29
2	9	$22.00	44	198
10	24	$17.00	170	408
25	49	$14.00	350	686
50	99	$10.00	500	990

Note that two numbers of licenses will give an expenditure of $500. The first is between 35 and 36, and the second is 50.



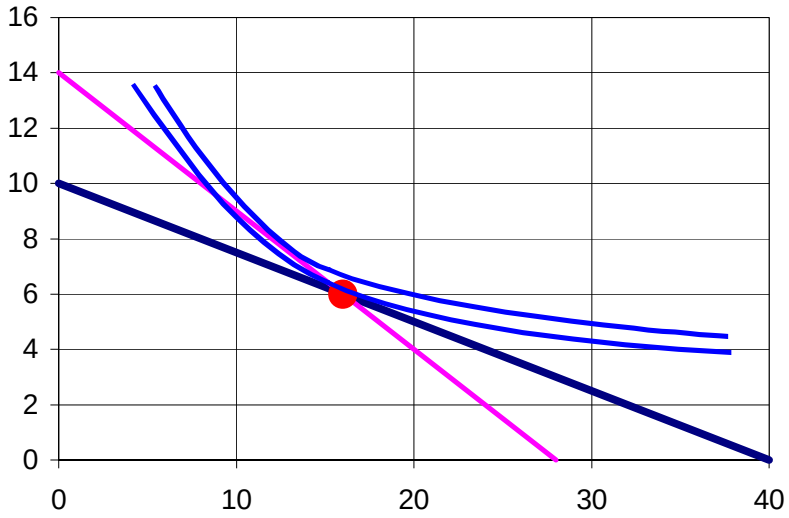
5) *Carmen has an income of $10 which she spends on potatoes and all other goods. Potatoes cost $0.50 per pound.*

a) *Suppose that the government agrees to pay half of Carmen's potato bill so that potatoes now only cost her $0.25 per pound. She now chooses to buy 16 pounds of potatoes. Show how the government program affects Carmen's budget line. Show Carmen's optimal consumption point, x^* and list its coordinates.*

The entire graph is shown below. The Government-induced budget curve is in dark blue. Carmen's optimal consumption point is (16, $6)

b) *Now suppose that the government ends the program in part (a) and instead decides to give Carmen a cash gift of $4. Show Carmen's new budget line. Does it go above, below or through x^*? How do you know?*

Her new budget line goes through the old x^* (in Magenta). To see this, observe that if she were to buy $16^{\#}$ of potatoes she would still be left with $6 exactly as before.



c) *Of the two programs, which is the more expensive for the government? Which does Carmen prefer? Explain.*

In the first case, the government pays 16# × $0.25 / # = $4, which is exactly what it pays in the second case. Carmen will prefer the second program. To see this, notice first that, since her former bundle is affordable, she cannot be made worse off. Second, if preferences are "smooth", then, since the new budget line cuts through the old indifference curve, the cash option will put her on a higher indifference curve.

6) *Consider an economy consisting of two consumers: Anne and Bob both of whom have income of m = 100. Both consume rice and pasta only. Denote quantities of rice by x_1 and quantities of pasta by x_2. The price of pasta is $p_2 = 2$. ~~For both consumers rice and pasta are perfect substitutes~~:*

a) *Anne's preferences are given by $u^A(x_1, x_2) = 2x_1 + x_2$. Draw indifference curves for Anne.*

Below, in Green.

b) *Suppose that Bob's preferences are given by $u^B(x_1, x_2) = x_1x_2$. Draw indifference curves for Bob.*

Below, in blue. In spite of what it said in the question above, these preferences are not consistent with perfect substitutes.

c) *Suppose that $p_1 = 5$. Draw a budget constraint for Anne and Bob. What would be their optimal choices of rice and pasta?*

The budget constraint is the same for both people and is shown in red.

Since for Anne, rice and pasta are perfect substitutes, she will only consume whichever is cheaper. Which, in this case, is Pasta.

Bob's preferences are Cobb-Douglass. Knowing that, we know that his consumption of rice and pasta will be: $x_1 = \frac{a}{a+b}\frac{m}{p_1} = \frac{1}{2}\frac{100}{5} = 10$, and $x_2 = \frac{a}{a+b}\frac{m}{p_2} = \frac{1}{2}\frac{100}{2} = 25$. Utility in this case is $U = 250$. The graph is below.