

Economics 101
Spring 2001
Problem Set #6

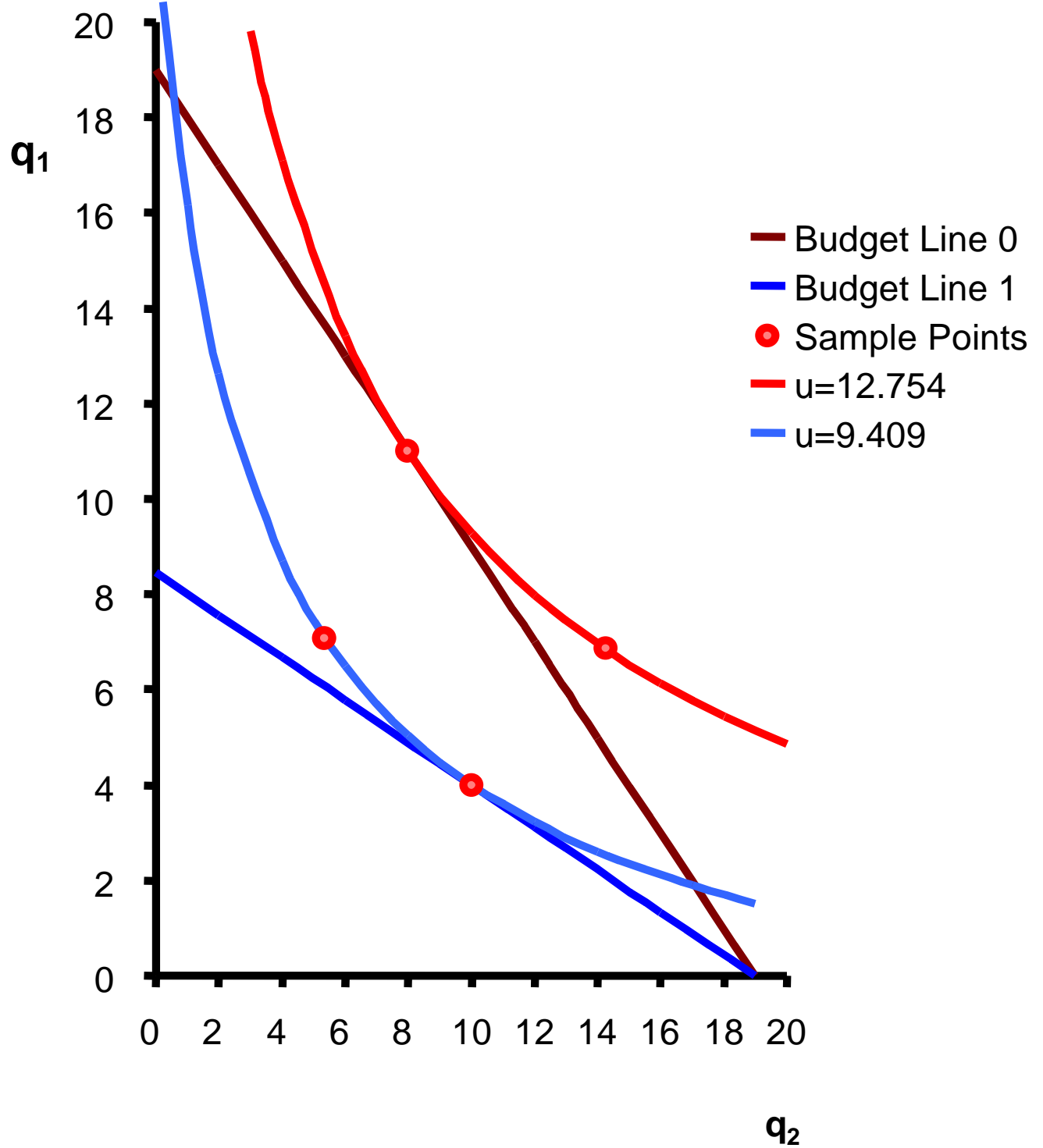
Due date: March 9, 2001

1. On the graphs on the attached pages, there is an increase in the price of good 1. The initial situation is $p_1 = 4$, $p_2 = 4$, and income = 76. Then the price of p_1 rises to 9. The consumer buys less of good one as its price rises. In the first diagram show the income and substitution effect of the price change where the real income is evaluated at the new utility level. That is, consider an income change that moves the consumer to the new indifference curve with no change in prices.
 - a. Show the initial equilibrium and label it as point A.
 - b. Show the subsequent equilibrium and label it as point B.
 - c. Show where the consumer would move due to the income effect and label it point C.
 - d. Use arrows to show the substitution effect.
 - e. Is good 1 a normal or inferior good?

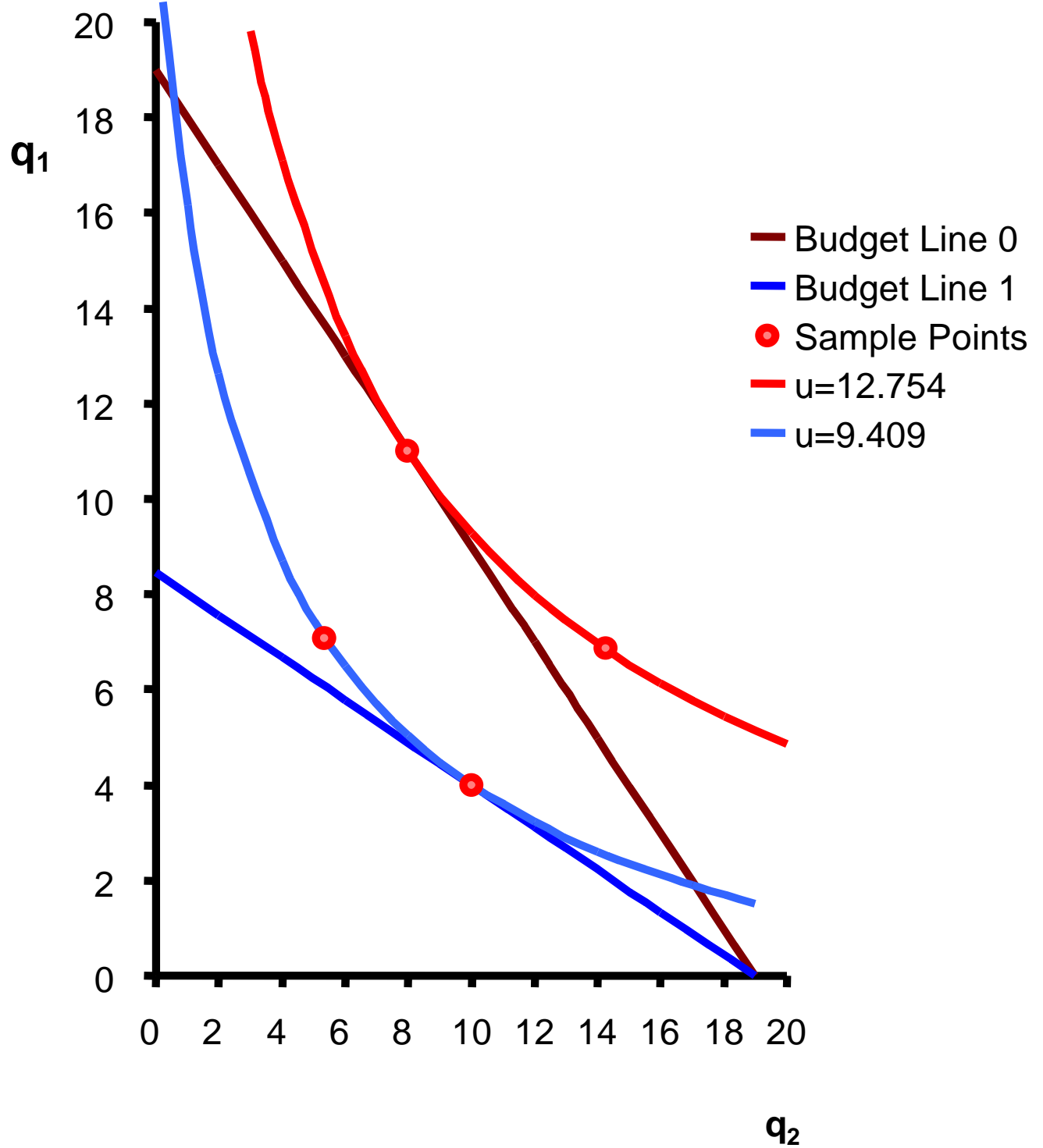
2. In the second diagram show the income and substitution effect of the price change where the real income is evaluated at the old utility level. That is, consider an income change that moves the consumer to the old indifference curve with the change in prices.
 - a. Show the initial equilibrium and label it as point A.
 - b. Show the subsequent equilibrium and label it as point B.
 - c. Show where the consumer would move due to the income effect and label it point C.
 - d. Use arrows to show the substitution effect.
 - e. Is good 1 a normal or inferior good?

3. In the third diagram there is an decrease in the price of good 1. The initial situation is $p_1 = 1$, $p_2 = 1$, and income = 80. Then the price of p_1 falls to 0.40. The consumer buys more of good one as its price falls. In the diagram show the income and substitution effect of the price change where the real income is evaluated at the new utility level. That is, consider an income change that moves the consumer to the new indifference curve with no change in prices.
 - a. Show the initial equilibrium and label it as point A.
 - b. Show the subsequent equilibrium and label it as point B.
 - c. Show where the consumer would move due to the income effect and label it point C.
 - d. Use arrows to show the substitution effect.
 - e. Is good 1 a normal or inferior good?

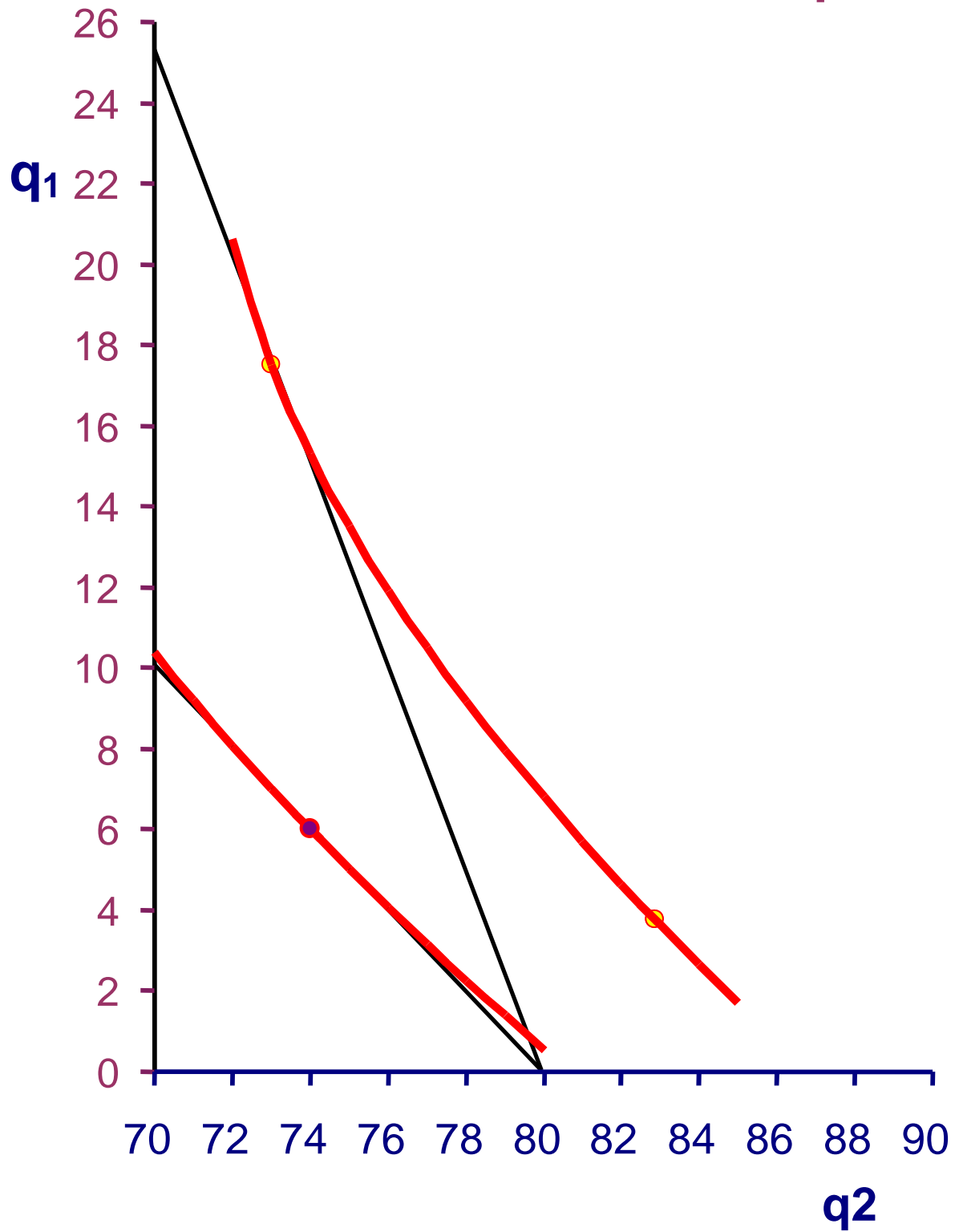
Increase in the price of good 1



Increase in the price of good 1



Decrease in p_1



4. Consider the following data on a production function.

x_1	x_2	Cost	y	MPP_1	MPP_2
16.00	1.00	40.00	20.00	0.31	10.00
13.22	1.10	35.25	20.00	0.38	9.09
11.11	1.20	31.82	20.00	0.45	8.33
9.47	1.30	29.33	20.00	0.53	7.69
8.16	1.40	27.53	20.00	0.61	7.14
7.11	1.50	26.22	20.00	0.70	6.67
6.25	1.60	25.30	20.00	0.80	6.25
5.54	1.70	24.67	20.00	0.90	5.88
4.94	1.80	24.28	20.00	1.01	5.56
4.43	1.90	24.06	20.00	1.13	5.26
4.00	2.00	24.00	20.00	1.25	5.00
3.63	2.10	24.06	20.00	1.38	4.76
3.31	2.20	24.21	20.00	1.51	4.55
3.02	2.30	24.45	20.00	1.65	4.35
2.78	2.40	24.76	20.00	1.80	4.17
2.56	2.50	25.12	20.00	1.95	4.00
2.37	2.60	25.53	20.00	2.11	3.85
2.19	2.70	25.99	20.00	2.28	3.70
2.04	2.80	26.48	20.00	2.45	3.57
1.90	2.90	27.00	20.00	2.63	3.45
1.78	3.00	27.56	20.00	2.81	3.33
1.66	3.10	28.13	20.00	3.00	3.23
1.56	3.20	28.73	20.00	3.20	3.13
1.47	3.30	29.34	20.00	3.40	3.03
1.38	3.40	29.97	20.00	3.61	2.94
1.31	3.50	30.61	20.00	3.83	2.86
1.23	3.60	31.27	20.00	4.05	2.78
1.17	3.70	31.94	20.00	4.28	2.70
1.11	3.80	32.62	20.00	4.51	2.63
1.05	3.90	33.30	20.00	4.75	2.56
1.00	4.00	34.00	20.00	5.00	2.50
0.95	4.10	34.70	20.00	5.25	2.44
0.91	4.20	35.41	20.00	5.51	2.38

a. Show that as x_2 goes from 2 to 2.1 that

$$MPP_{x_1} \Delta x_1 + MPP_{x_2} \Delta x_2 \approx 0$$

Use MPP at 2 and be happy if the answer is approximate.

b. Show that as x_2 goes from 4 to 4.1 that

$$MPP_{x_1} \Delta x_1 + MPP_{x_2} \Delta x_2 \approx 0$$

Use MPP at 4.

5. Consider the following production function

$$y = 22x_1 + 14x_2 - x_1^2 - x_2^2$$

Fill in the following table where discrete MPP_1 is computed holding x_2 constant. Enter the marginal product from increasing x_1 from 0 to 1 while holding x_2 constant at 1 on the $x_1 = 1, x_2 = 1$ line, etc.

x_1	x_2	y	APP_1	APP_2	MPP_1
0	1	13	DIV/0	13	NA
1	1	34	34	34	21
2	1	53	26.5	53	19
3	1	70	23.333		
4	1	85	21.25		
6	1	109	18.167		12
0	2	24	DIV/0	12	NA
1	2	45	45	22.5	
2	2	64	32	32	
3	2	81		40.5	
4	2	96		48	15
6	2	120		60	
8	2	136		68	
0	3	33			NA
1	3	54			21
2	3	73			19
3	3	90	30	30	
4	3	105	26.25	35	
6	3	129		43	12
8	3	145		48.3333	8
0	4	40	DIV/0		NA
1	4	61	61	15.25	21
2	4	80	40		19
3	4	97		24.25	17
4	4	112		28	15
6	4	136	22.667	34	
0	5	45	DIV/0	9	NA
1	5	66		13.2	21
2	5	85		17	19
3	5	102		20.4	
4	5	117	29.25		15
6	5	141	23.5	28.2	12
8	5	157	19.625	31.4	

6. Work question 1 from Skills and Tools in Chapter 6.
7. Work question 2 from Skills and Tools in Chapter 6.
8. Work question 3 from Skills and Tools in Chapter 6.
9. Work question 4 from Skills and Tools in Chapter 6.