Quantity Nachos	Total Utility Nachos	Quantity Milk	Total Utility Milk	Quantity Twinkies	Total Utility Twinkies	Quantity Music	Total Utility Music	Quantity Savings	Total Utility Savings
1	10	1	15	1	12	1	20	1	25
2	19	2	28	2	22	2	35	2	40
3	27	3	38	3	30	3	45	3	50
4	34	4	46	4	36	4	52	4	55
5	40	5	52	5	40	5	58	5	58
6	44	6	56	6	42	6	62	6	60

You were given the above table and the following prices and budget information:

Nachos	$	3.00
Milk	$	4.00
Twinkies	$	1.00
Music	$	3.50
Savings	$	5.00
Budget	$	66.00

The utility maximizing rule states that utility will be maximized when the ratio of marginal utility to price for the last unit purchased of each good purchased is equal. In this situation that means that utility is maximized when this is satisfied: $\mathbf{MU^{Last\ Nachos}/P^{Nachos} = MU^{Last\ Milk}/P^{Milk} = MU^{Last\ Twinkies}/P^{Twinkies} = MU^{Last\ Music}/P^{Music} = MU^{Last\ Savings}/P^{Savings}}$

The first step to solving this problem is to calculate the marginal utility for each product consumed. MU = Change in TU/ Change in Q. Below are the results from this calculation.

Quantity	Total Utility Nachos	Marginal Utility Nachos	Total Utility Milk	Marginal Utility Milk	Total Utility Twinkies	Marginal Utility Twinkies	Total Utility Music	Marginal Utility Music	Total Utility Savings	Marginal Utility Savings
1	10	10	15	15	12	12	20	20	25	25
2	19	9	28	13	22	10	35	15	40	15
3	27	8	38	10	30	8	45	10	50	10
4	34	7	46	8	36	6	52	7	55	5
5	40	6	52	6	40	4	58	6	58	3
6	44	4	56	4	42	2	62	4	60	2

The next step to solving this problem is to calculate the ratio of marginal utility to price (what I call marginal utility per dollar). This is accomplished by dividing the marginal utility of a unit of a product by its price. Here are the results of this calculation.

Quantity	Marginal Utility Nachos	Marginal Utility per Dollar Nachos	Marginal Utility Milk	Marginal Utility per Dollar Milk	Marginal Utility Twinkies	Marginal Utility per Dollar Twinkies	Marginal Utility Music	Marginal Utility per Dollar Music	Marginal Utility Savings	Marginal Utility per Dollar Savings
1	10	3.33	15	3.75	12	12.00	20	5.71	25	5.00
2	9	3.00	13	3.25	10	10.00	15	4.29	15	3.00
3	8	2.67	10	2.50	8	8.00	10	2.86	10	2.00
4	7	2.33	8	2.00	6	6.00	7	2.00	5	1.00
5	6	2.00	6	1.50	4	4.00	6	1.71	3	0.60
6	4	1.33	4	1.00	2	2.00	4	1.14	2	0.40

Now we use the "purchase trail" to see how this consumer would spend the $66 (remember all money will always be spent). Also remember that the product purchased will always be the product with the highest available MU per dollar. Here's a long version of how it would work. The available choices are not "grayed out".

Purchase 1

Quantity	Marginal Utility Nachos	Marginal Utility per Dollar Nachos	Marginal Utility Milk	Marginal Utility per Dollar Milk	Marginal Utility Twinkies	Marginal Utility per Dollar Twinkies	Marginal Utility Music	Marginal Utility per Dollar Music	Marginal Utility Savings	Marginal Utility per Dollar Savings
1	10	3.33	15	3.75	12	12.00	20	5.71	25	5.00
2	9	3.00	13	3.25	10	10.00	15	4.29	15	3.00
3	8	2.67	10	2.50	8	8.00	10	2.86	10	2.00
4	7	2.33	8	2.00	6	6.00	7	2.00	5	1.00
5	6	2.00	6	1.50	4	4.00	6	1.71	3	0.60
6	4	1.33	4	1.00	2	2.00	4	1.14	2	0.40

Highest MU per dollar is Twinkie # 1. This costs $1 and leaves $65 to spend.

Purchase 2

Quantity	Marginal Utility Nachos	Marginal Utility per Dollar Nachos	Marginal Utility Milk	Marginal Utility per Dollar Milk	Marginal Utility Twinkies	Marginal Utility per Dollar Twinkies	Marginal Utility Music	Marginal Utility per Dollar Music	Marginal Utility Savings	Marginal Utility per Dollar Savings
1	10	3.33	15	3.75	12	12.00	20	5.71	25	5.00
2	9	3.00	13	3.25	10	10.00	15	4.29	15	3.00
3	8	2.67	10	2.50	8	8.00	10	2.86	10	2.00
4	7	2.33	8	2.00	6	6.00	7	2.00	5	1.00
5	6	2.00	6	1.50	4	4.00	6	1.71	3	0.60
6	4	1.33	4	1.00	2	2.00	4	1.14	2	0.40

Highest MU per dollar is Twinkie # 2. This costs $1 and leaves $64 to spend.

Purchase 3

Quantity	Marginal Utility Nachos	Marginal Utility per Dollar Nachos	Marginal Utility Milk	Marginal Utility per Dollar Milk	Marginal Utility Twinkies	Marginal Utility per Dollar Twinkies	Marginal Utility Music	Marginal Utility per Dollar Music	Marginal Utility Savings	Marginal Utility per Dollar Savings
1	10	3.33	15	3.75	12	12.00	20	5.71	25	5.00
2	9	3.00	13	3.25	10	10.00	15	4.29	15	3.00
3	8	2.67	10	2.50	8	8.00	10	2.86	10	2.00
4	7	2.33	8	2.00	6	6.00	7	2.00	5	1.00
5	6	2.00	6	1.50	4	4.00	6	1.71	3	0.60
6	4	1.33	4	1.00	2	2.00	4	1.14	2	0.40

Highest MU per dollar is Twinkie # 3. This costs $1 and leaves $63 to spend.

Purchase 4

Quantity	Marginal Utility Nachos	Marginal Utility per Dollar Nachos	Marginal Utility Milk	Marginal Utility per Dollar Milk	Marginal Utility Twinkies	Marginal Utility per Dollar Twinkies	Marginal Utility Music	Marginal Utility per Dollar Music	Marginal Utility Savings	Marginal Utility per Dollar Savings
1	10	3.33	15	3.75	12	12.00	20	5.71	25	5.00
2	9	3.00	13	3.25	10	10.00	15	4.29	15	3.00
3	8	2.67	10	2.50	8	8.00	10	2.86	10	2.00
4	7	2.33	8	2.00	6	6.00	7	2.00	5	1.00
5	6	2.00	6	1.50	4	4.00	6	1.71	3	0.60
6	4	1.33	4	1.00	2	2.00	4	1.14	2	0.40

Highest MU per dollar is Twinkie # 4. This costs $1 and leaves $62 to spend.

Purchase 5

Quantity	Marginal Utility Nachos	Marginal Utility per Dollar Nachos	Marginal Utility Milk	Marginal Utility per Dollar Milk	Marginal Utility Twinkies	Marginal Utility per Dollar Twinkies	Marginal Utility Music	Marginal Utility per Dollar Music	Marginal Utility Savings	Marginal Utility per Dollar Savings
1	10	3.33	15	3.75	12	12.00	20	5.71	25	5.00
2	9	3.00	13	3.25	10	10.00	15	4.29	15	3.00
3	8	2.67	10	2.50	8	8.00	10	2.86	10	2.00
4	7	2.33	8	2.00	6	6.00	7	2.00	5	1.00
5	6	2.00	6	1.50	4	4.00	6	1.71	3	0.60
6	4	1.33	4	1.00	2	2.00	4	1.14	2	0.40

Highest MU per dollar is Music # 1. This costs $3.50 and leaves $58.50 to spend.

Purchase 6

Quantity	Marginal Utility Nachos	Marginal Utility per Dollar Nachos	Marginal Utility Milk	Marginal Utility per Dollar Milk	Marginal Utility Twinkies	Marginal Utility per Dollar Twinkies	Marginal Utility Music	Marginal Utility per Dollar Music	Marginal Utility Savings	Marginal Utility per Dollar Savings
1	10	3.33	15	3.75	12	12.00	20	5.71	25	5.00
2	9	3.00	13	3.25	10	10.00	15	4.29	15	3.00
3	8	2.67	10	2.50	8	8.00	10	2.86	10	2.00
4	7	2.33	8	2.00	6	6.00	7	2.00	5	1.00
5	6	2.00	6	1.50	4	4.00	6	1.71	3	0.60
6	4	1.33	4	1.00	2	2.00	4	1.14	2	0.40

Highest MU per dollar is Savings # 1. This costs $5.00 and leaves $53.50 to spend.

Purchase 7

Quantity	Marginal Utility Nachos	Marginal Utility per Dollar Nachos	Marginal Utility Milk	Marginal Utility per Dollar Milk	Marginal Utility Twinkies	Marginal Utility per Dollar Twinkies	Marginal Utility Music	Marginal Utility per Dollar Music	Marginal Utility Savings	Marginal Utility per Dollar Savings
1	10	3.33	15	3.75	12	12.00	20	5.71	25	5.00
2	9	3.00	13	3.25	10	10.00	15	4.29	15	3.00
3	8	2.67	10	2.50	8	8.00	10	2.86	10	2.00
4	7	2.33	8	2.00	6	6.00	7	2.00	5	1.00
5	6	2.00	6	1.50	4	4.00	6	1.71	3	0.60
6	4	1.33	4	1.00	2	2.00	4	1.14	2	0.40

Highest MU per dollar is Music # 2. This costs $3.50 and leaves $50.00 to spend.

Purchase 8

Quantity	Marginal Utility Nachos	Marginal Utility per Dollar Nachos	Marginal Utility Milk	Marginal Utility per Dollar Milk	Marginal Utility Twinkies	Marginal Utility per Dollar Twinkies	Marginal Utility Music	Marginal Utility per Dollar Music	Marginal Utility Savings	Marginal Utility per Dollar Savings
1	10	3.33	15	3.75	12	12.00	20	5.71	25	5.00
2	9	3.00	13	3.25	10	10.00	15	4.29	15	3.00
3	8	2.67	10	2.50	8	8.00	10	2.86	10	2.00
4	7	2.33	8	2.00	6	6.00	7	2.00	5	1.00
5	6	2.00	6	1.50	4	4.00	6	1.71	3	0.60
6	4	1.33	4	1.00	2	2.00	4	1.14	2	0.40

Highest MU per dollar is Twinkie #5. This costs $1.00 and leaves $49.00 to spend.

Purchase 9

Quantity	Marginal Utility Nachos	Marginal Utility per Dollar Nachos	Marginal Utility Milk	Marginal Utility per Dollar Milk	Marginal Utility Twinkies	Marginal Utility per Dollar Twinkies	Marginal Utility Music	Marginal Utility per Dollar Music	Marginal Utility Savings	Marginal Utility per Dollar Savings
1	10	3.33	15	3.75	12	12.00	20	5.71	25	5.00
2	9	3.00	13	3.25	10	10.00	15	4.29	15	3.00
3	8	2.67	10	2.50	8	8.00	10	2.86	10	2.00
4	7	2.33	8	2.00	6	6.00	7	2.00	5	1.00
5	6	2.00	6	1.50	4	4.00	6	1.71	3	0.60
6	4	1.33	4	1.00	2	2.00	4	1.14	2	0.40

Highest MU per dollar is Milk # 1. This costs $4.00 and leaves $45.00 to spend.

Purchase 10

Quantity	Marginal Utility Nachos	Marginal Utility per Dollar Nachos	Marginal Utility Milk	Marginal Utility per Dollar Milk	Marginal Utility Twinkies	Marginal Utility per Dollar Twinkies	Marginal Utility Music	Marginal Utility per Dollar Music	Marginal Utility Savings	Marginal Utility per Dollar Savings
1	10	3.33	15	3.75	12	12.00	20	5.71	25	5.00
2	9	3.00	13	3.25	10	10.00	15	4.29	15	3.00
3	8	2.67	10	2.50	8	8.00	10	2.86	10	2.00
4	7	2.33	8	2.00	6	6.00	7	2.00	5	1.00
5	6	2.00	6	1.50	4	4.00	6	1.71	3	0.60
6	4	1.33	4	1.00	2	2.00	4	1.14	2	0.40

Highest MU per dollar is Nacho # 1. This costs $3.00 and leaves $42.00 to spend.

Purchase 11

Quantity	Marginal Utility Nachos	Marginal Utility per Dollar Nachos	Marginal Utility Milk	Marginal Utility per Dollar Milk	Marginal Utility Twinkies	Marginal Utility per Dollar Twinkies	Marginal Utility Music	Marginal Utility per Dollar Music	Marginal Utility Savings	Marginal Utility per Dollar Savings
1	10	3.33	15	3.75	12	12.00	20	5.71	25	5.00
2	9	3.00	13	3.25	10	10.00	15	4.29	15	3.00
3	8	2.67	10	2.50	8	8.00	10	2.86	10	2.00
4	7	2.33	8	2.00	6	6.00	7	2.00	5	1.00
5	6	2.00	6	1.50	4	4.00	6	1.71	3	0.60
6	4	1.33	4	1.00	2	2.00	4	1.14	2	0.40

Highest MU per dollar is Milk # 2. This costs $4.00 and leaves $38.00 to spend.

Purchase 12

Quantity	Marginal Utility Nachos	Marginal Utility per Dollar Nachos	Marginal Utility Milk	Marginal Utility per Dollar Milk	Marginal Utility Twinkies	Marginal Utility per Dollar Twinkies	Marginal Utility Music	Marginal Utility per Dollar Music	Marginal Utility Savings	Marginal Utility per Dollar Savings
1	10	3.33	15	3.75	12	12.00	20	5.71	25	5.00
2	9	3.00	13	3.25	10	10.00	15	4.29	15	3.00
3	8	2.67	10	2.50	8	8.00	10	2.86	10	2.00
4	7	2.33	8	2.00	6	6.00	7	2.00	5	1.00
5	6	2.00	6	1.50	4	4.00	6	1.71	3	0.60
6	4	1.33	4	1.00	2	2.00	4	1.14	2	0.40

Highest MU per dollar is found at both Nacho # 2 and Savings # 2 (this means that we're indifferent between the second nacho and the second savings). We still have $38 so we can afford both; the Nachos cost $3 and the Savings costs $5, meaning we spend $8 this time. This leaves us with $30 to spend.

Purchase 13

Quantity	Marginal Utility Nachos	Marginal Utility per Dollar Nachos	Marginal Utility Milk	Marginal Utility per Dollar Milk	Marginal Utility Twinkies	Marginal Utility per Dollar Twinkies	Marginal Utility Music	Marginal Utility per Dollar Music	Marginal Utility Savings	Marginal Utility per Dollar Savings
1	10	3.33	15	3.75	12	12.00	20	5.71	25	5.00
2	9	3.00	13	3.25	10	10.00	15	4.29	15	3.00
3	8	2.67	10	2.50	8	8.00	10	2.86	10	2.00
4	7	2.33	8	2.00	6	6.00	7	2.00	5	1.00
5	6	2.00	6	1.50	4	4.00	6	1.71	3	0.60
6	4	1.33	4	1.00	2	2.00	4	1.14	2	0.40

Highest MU per dollar is Music # 3. This costs $3.50 and leaves us with $26.50 to spend.

Purchase 14

Quantity	Marginal Utility Nachos	Marginal Utility per Dollar Nachos	Marginal Utility Milk	Marginal Utility per Dollar Milk	Marginal Utility Twinkies	Marginal Utility per Dollar Twinkies	Marginal Utility Music	Marginal Utility per Dollar Music	Marginal Utility Savings	Marginal Utility per Dollar Savings
1	10	3.33	15	3.75	12	12.00	20	5.71	25	5.00
2	9	3.00	13	3.25	10	10.00	15	4.29	15	3.00
3	8	2.67	10	2.50	8	8.00	10	2.86	10	2.00
4	7	2.33	8	2.00	6	6.00	7	2.00	5	1.00
5	6	2.00	6	1.50	4	4.00	6	1.71	3	0.60
6	4	1.33	4	1.00	2	2.00	4	1.14	2	0.40

Highest MU per dollar is Nacho # 3. This costs $3.00 and leaves us with $23.50 to spend.

Purchase 15

Quantity	Marginal Utility Nachos	Marginal Utility per Dollar Nachos	Marginal Utility Milk	Marginal Utility per Dollar Milk	Marginal Utility Twinkies	Marginal Utility per Dollar Twinkies	Marginal Utility Music	Marginal Utility per Dollar Music	Marginal Utility Savings	Marginal Utility per Dollar Savings
1	10	3.33	15	3.75	12	12.00	20	5.71	25	5.00
2	9	3.00	13	3.25	10	10.00	15	4.29	15	3.00
3	8	2.67	10	2.50	8	8.00	10	2.86	10	2.00
4	7	2.33	8	2.00	6	6.00	7	2.00	5	1.00
5	6	2.00	6	1.50	4	4.00	6	1.71	3	0.60
6	4	1.33	4	1.00	2	2.00	4	1.14	2	0.40

Highest MU per dollar is Milk # 3. This costs $4.00 and leaves us with $19.50 to spend.

Purchase 16

Quantity	Marginal Utility Nachos	Marginal Utility per Dollar Nachos	Marginal Utility Milk	Marginal Utility per Dollar Milk	Marginal Utility Twinkies	Marginal Utility per Dollar Twinkies	Marginal Utility Music	Marginal Utility per Dollar Music	Marginal Utility Savings	Marginal Utility per Dollar Savings
1	10	3.33	15	3.75	12	12.00	20	5.71	25	5.00
2	9	3.00	13	3.25	10	10.00	15	4.29	15	3.00
3	8	2.67	10	2.50	8	8.00	10	2.86	10	2.00
4	7	2.33	8	2.00	6	6.00	7	2.00	5	1.00
5	6	2.00	6	1.50	4	4.00	6	1.71	3	0.60
6	4	1.33	4	1.00	2	2.00	4	1.14	2	0.40

Highest MU per dollar is Nachos # 4. This costs $3.00 and leaves us with $16.50 to spend.

Purchase 17

Quantity	Marginal Utility Nachos	Marginal Utility per Dollar Nachos	Marginal Utility Milk	Marginal Utility per Dollar Milk	Marginal Utility Twinkies	Marginal Utility per Dollar Twinkies	Marginal Utility Music	Marginal Utility per Dollar Music	Marginal Utility Savings	Marginal Utility per Dollar Savings
1	10	3.33	15	3.75	12	12.00	20	5.71	25	5.00
2	9	3.00	13	3.25	10	10.00	15	4.29	15	3.00
3	8	2.67	10	2.50	8	8.00	10	2.86	10	2.00
4	7	2.33	8	2.00	6	6.00	7	2.00	5	1.00
5	6	2.00	6	1.50	4	4.00	6	1.71	3	0.60
6	4	1.33	4	1.00	2	2.00	4	1.14	2	0.40

Note that now the MU per dollar for each product is the same - this is a possible solution. We are indifferent between our choices and it would cost $16.50 to purchase one of each; we have exactly $16.50 so we would go ahead and buy our 5th Nachos; 4th Milk; 6th Twinkie; 4th Music; and 3rd Savings. We would have $0 left to spend.

Now we need to tally up our aggregate total utility from all of our purchases. To do this we go back and look at the total utility from 5 Nachos plus the total utility from 4 Milk plus the total utility from 6 Twinkies plus the total utility from 4 Music plus the total utility from 3 Savings. Something like this:

Product	Quanity	Total Utility
Nachos	5	40
Milk	4	46
Twinkies	6	42
Music	4	52
Savings	3	50
	Aggregate Total Utility	**230**

Now, use this same process to see how you did on part "b". Here is the price and budget information for part "b".

Nachos	$	3.00
Milk	$	2.00
Twinkies	$	4.00
Music	$	5.00
Savings	$	5.00
Budget	$	40.00

Remember, when you answer this part, you will need to recalculate marginal utility per dollar because some prices have changed.