Appendix: Using Indifference Curves and Budget Lines to Understand Consumer Behavior

Consumption Bundle *A*	Consumption Bundle *B*
2 slices of pizza and 1 can of Coke	1 slice of pizza and 2 cans of Coke

Suppose Dave is faced with the choice of the above two weekly "consumption bundles."

It seems reasonable to assume that either:

- Dave prefers bundle *A* to bundle *B*
- Dave prefers bundle *B* to bundle *A*
- Dave is **indifferent** between bundles *A* and *B*; that is, Dave would be equally happy with either *A* or *B*.

In the first situation, we would say Dave gets **higher utility** from *A* than from *B*; in the third, that the utility from *A* and *B* was the same.

Figure 10A.1 Plotting Dave's Preferences for Pizza and Coke (1 of 4)

Suppose Dave is indeed indifferent between *B* and *F*, and suppose we could find all of the bundles that Dave liked exactly as much.

- Perhaps bundle *E*: 2 slices of pizza and 8 cans of Coke would make Dave just as happy.

The curve marked I_3 is an **indifference curve** for Dave: a curve showing the combinations of consumption bundles that give the consumer the same utility.

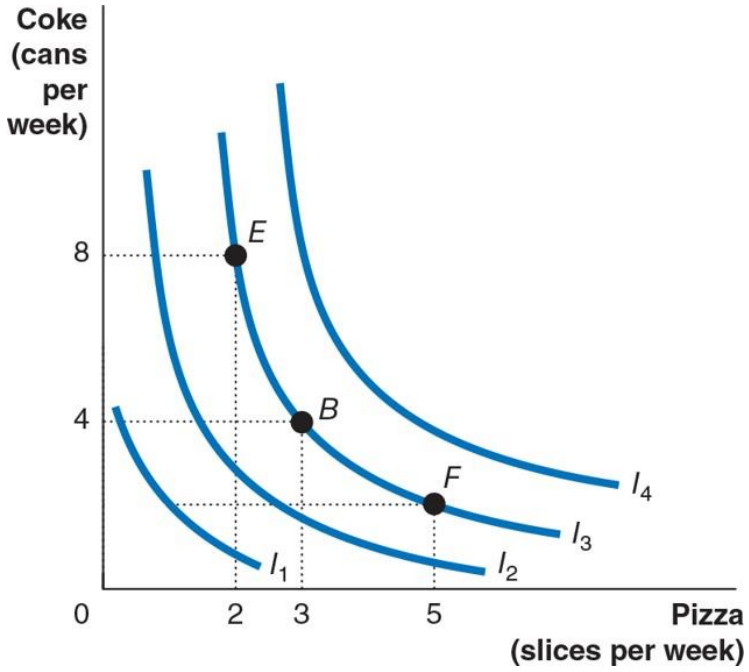
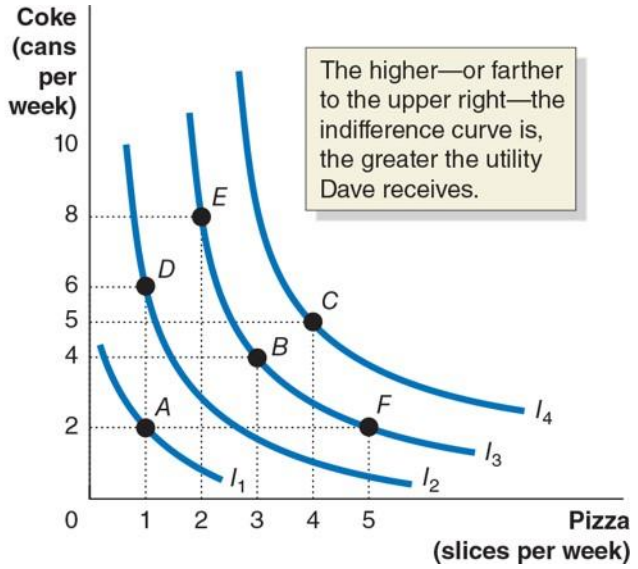


Figure 10A.1 Plotting Dave's Preferences for Pizza and Coke (2 of 4)

Consumption Bundle	Slices of Pizza	Cans of Coke
A	1	2
B	3	4
C	4	5
D	1	6
E	2	8
F	5	2



Lower indifference curves represent lower levels of utility; higher indifference curves represent higher levels of utility.

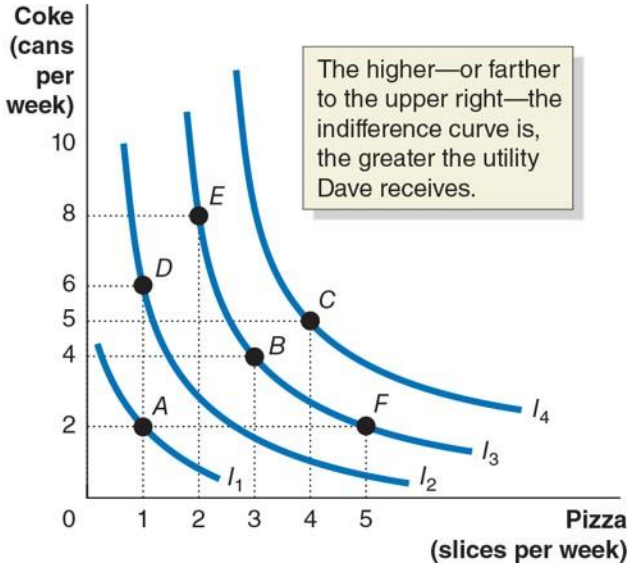
Bundle *A* is on I_1, a lower indifference curve, and it is clearly worse than

E, *B*, or *F*, since it has less pizza and Coke than any. of those bundles.

Bundle *C* is on a higher indifference curve and is clearly better than *B* (more pizza and Coke).

Figure 10A.1 Plotting Dave's Preferences for Pizza and Coke (3 of 4)

Consumption Bundle	Slices of Pizza	Cans of Coke
A	1	2
B	3	4
C	4	5
D	1	6
E	2	8
F	5	2

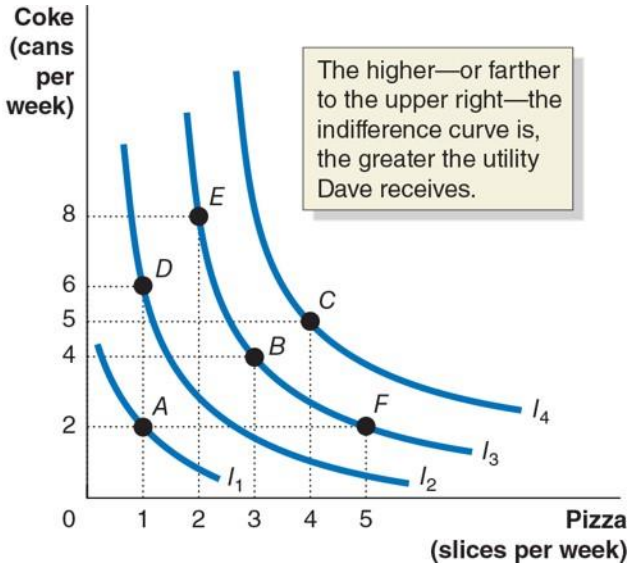


Comparing *B* and *D* is a little trickier.

- A reasonable person could prefer *D* to *B*, say if he only cared about how much Coke he received.
- But the indifference curves reveal that Dave prefers *B* to *D*, since *D* is on a lower indifference curve to *B*.

Figure 10A.1 Plotting Dave's Preferences for Pizza and Coke (4 of 4)

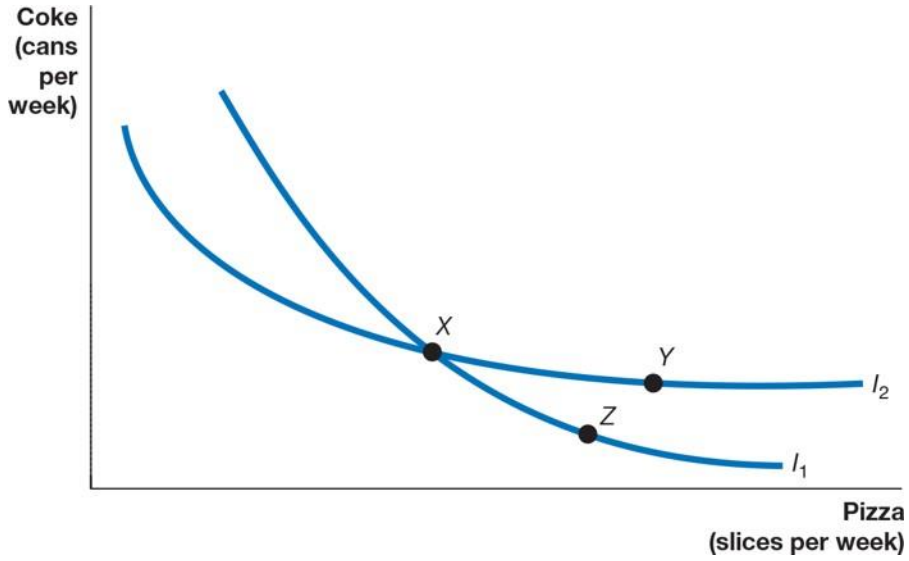
Consumption Bundle	Slices of Pizza	Cans of Coke
A	1	2
B	3	4
C	4	5
D	1	6
E	2	8
F	5	2



Marginal rate of substitution (*MRS*) is the rate at which the consumer is willing to trade off one product for another, while keeping the consumer's utility constant.

- Graphically, this is the slope of the indifference curve.
- From *E* to *B*, Dave is willing to trade 4 cans of Coke for 1 slice of pizza; his *MRS* is 4 between *E* and *B*.
- *MRS* tends to decrease as we move to the right, giving indifference curves a convex shape.

Figure 10A.2 Indifference Curves Cannot Cross (1 of 2)

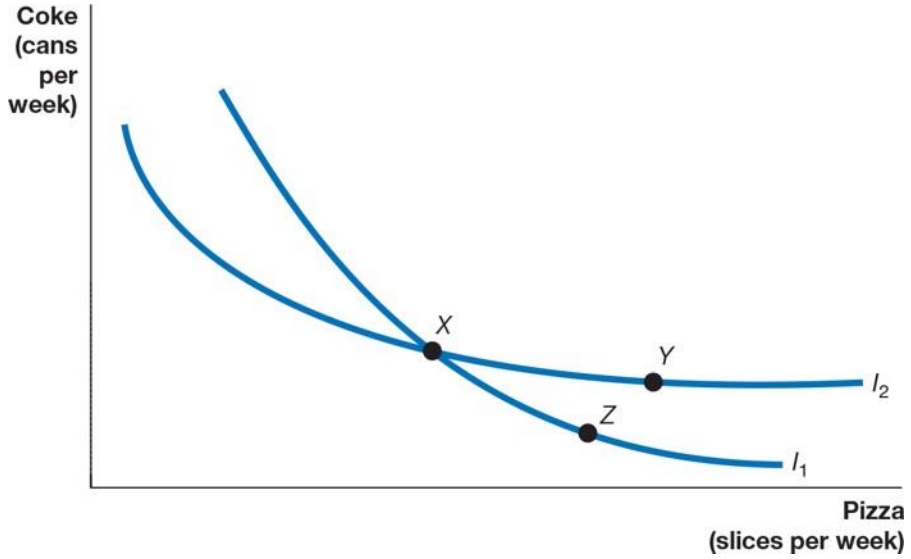


Bundles *X* and *Z* are on the same indifference curve, so Dave is indifferent between them.

- Similarly for bundles *X* and *Y*.

We generally assume that preferences are **transitive**, so that if a consumer is indifferent between *X* and *Z*, and *X* and *Y*, then he must also be indifferent between *Y* and *Z*.

Figure 10A.2 Indifference Curves Cannot Cross (2 of 2)



But Dave will prefer *Y* to *Z*, since *Y* has more pizza and Coke.

Since transitivity is such an intuitively sensible assumption, we conclude that indifference curves will never cross.

Figure 10A.3 Dave's Budget Constraint

A consumer's **budget constraint** is the amount of income he or she has available to spend on goods and services

The table shows bundles Dave can buy with $10, if pizza costs $2 per slice and Coke costs $1 per can.

The slope of the budget constraint is the (negative of the) ratio of prices; it represents the rate at which Dave is **allowed** to trade Coke for pizza: 2 cans of Coke per 1 slice of pizza.

Combinations of Pizza and Coke Dave Can Buy with $10

Consumption Bundle	Slices of Pizza	Cans of Coke	Total Spending
G	0	10	$10
H	1	8	10
I	2	6	10
J	3	4	10
K	4	2	10
L	5	0	10

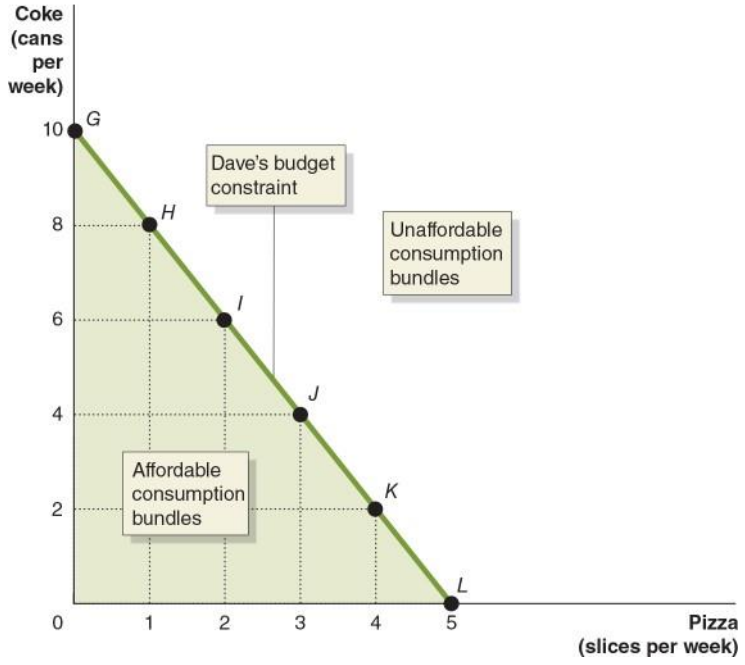


Figure 10A.4 Finding Optimal Consumption (1 of 2)

Dave would like to reach the highest indifference curve that he can.

He cannot reach I_4; no bundle on I_4 is within his budget constraint.

The highest indifference curve he can reach is I_3;

bundle B is Dave's best choice, given his budget constraint.

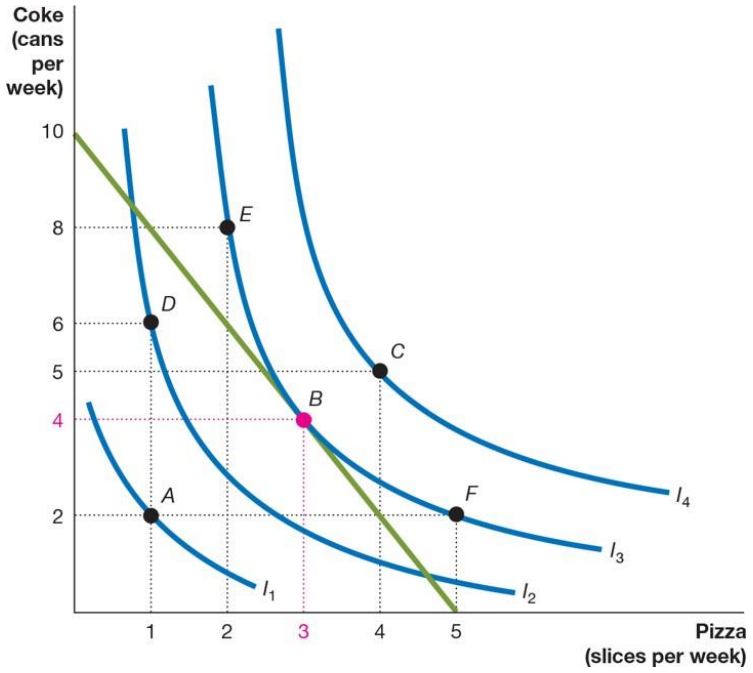
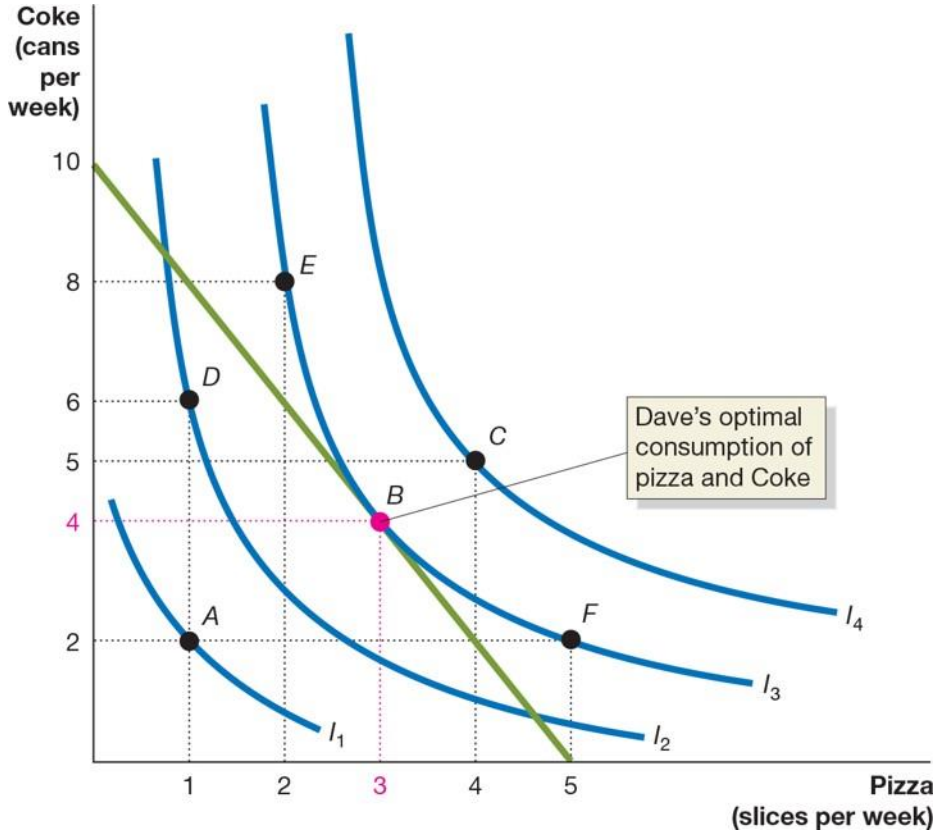


Figure 10A.4 Finding Optimal Consumption (2 of 2)

To maximize utility, a consumer needs to be on the highest indifference curve, given his budget constraint.

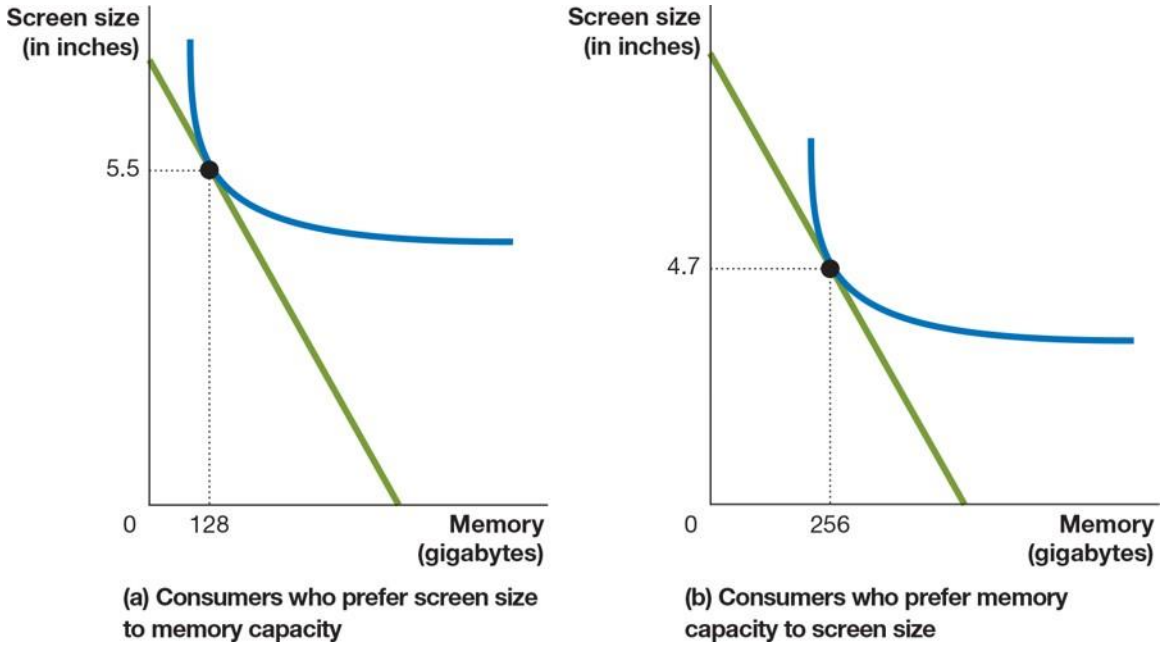
Notice that at this point, the indifference curve is just tangent to the budget line.



Apply the Concept: Apple Determines the Optimal Mix of iPhone Features

The budget line in the diagram shows combinations of screen size and memory that could be offered in a $500 phone.

Different consumers have different preferences, leading to different optimal mixes of iPhone features.



(a) Consumers who prefer screen size to memory capacity

(b) Consumers who prefer memory capacity to screen size

Figure 10A.5 How a Price Decrease Affects the Budget Constraint

When the price of pizza falls, Dave can buy more pizza than before.

If pizza falls to $1 per slice, Dave can buy 10 slices of pizza per week; he can still afford 10 cans of Coke per week.

The budget constraint rotates out along the pizza-axis to reflect this increase in purchasing power.

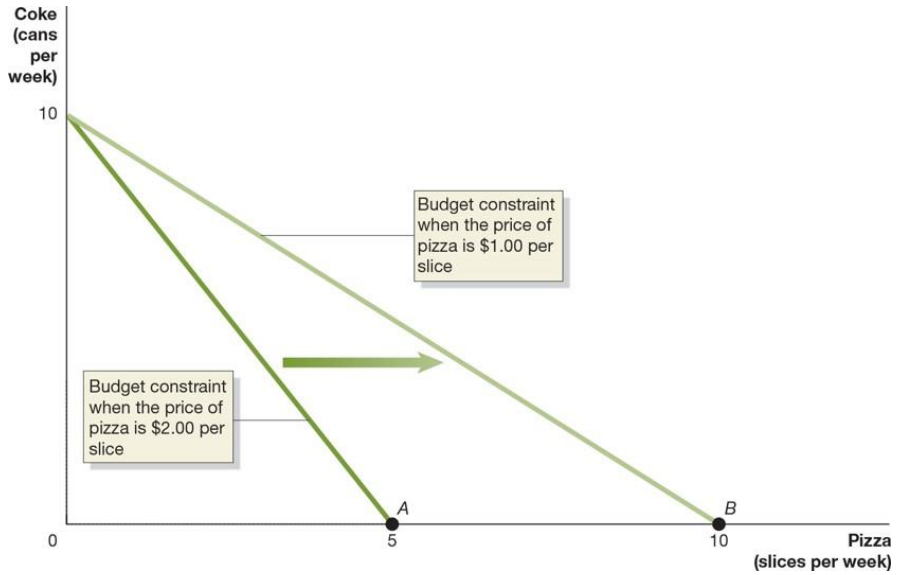


Figure 10A.6 How a Price Change Affects Optimal Consumption

As the price of pizza falls and the budget constraint rotates out, Dave's optimal bundle will change.

When pizza cost $2.00 per slice, Dave bought 3 slices.

- Now that pizza costs $1 per slice, Dave buys 7 slices.

These are two points on Dave's demand curve for pizza (assuming he has $10 and Coke costs $1 per can).