Where are we?

- To do today: finish the derivation of the demand curve using indifference curves

- Go on then to chapter ‘Production and Cost’
Utility and indifference curves

- The point is to find where on the budget line we are at maximum total utility.

- Need to know the relative levels of utility from all combinations of goods.

- Indifference curves represent this graphically.
An indifference curve is a line that shows combinations of goods among which a consumer is indifferent. Indifferent because the combinations yield same total utility.

Preference map is a set of indifference curves.
Indifference curves

Note: Two goods on the axes. We trace out combinations with the same total utility.
What it means to be on or off the curve
Tina prefers point $J$ to point $C$ or point $G$. And she prefers either point $C$ or point $G$ to any point on curve $I_0$. 

(a) Tina's indifference curve 

(b) Tina's preference map
Marginal rate of substitution (MRS)

MRS is the rate at which a person will give up good $y$ (the good measured on the $y$-axis) to get more of good $x$ (the good measured on the $x$-axis) and at the same time remain on the same indifference curve.
Diminishing MRS and MU

MRS diminishes as move down along an indifference curve

Why? From diminishing MU

As move down along the curve, get more x good.

MUx ________

But, get less y good, so MUy _______
MRS measures what are willing to give up

At what rate is this consumer willing to give up gum for water?

_____ packs of gum for

_____ bottles of water
Where is MU here?

*In the shape of the indifference curve!*

Moving down the indifference curve, the slope of tells us how much of the good on the y axis we are willing to give up to get more of the x good.

How do we know this amount? From the MU. Slope of the indifference curve is the ratio $\frac{MU_x}{MU_y}$. 


Putting it all together: Where is equilibrium?

Had equilibrium defined as MU/price = for all goods

Where is information about MU and prices now?

MU’s from slope of indifference curve (MUx/MUy)

Prices from \( \underline{\text{SLOPE}} \)
Why only the tangency and not intersection points?

At any intersection, can move to a higher total utility (higher indifference curve) if change the allocation of consumption between the two goods.

Only at the **tangency** can no move increase total utility (move to a higher indifference curve) because no higher curve is affordable.
Equilibrium rule the same

\[ \frac{MU_x}{Px} = \frac{MU_y}{Py} \]

Note: We can get this from the two slopes being set equal

\[ \frac{MU_x}{MU_y} = \frac{Px}{Py} \]

So, equilibrium where slopes of budget line and indifference curve are equal
Consumer Equilibrium Graphically

Had MU/$ = for all goods

Now have slopes of budget line and indifference curves. These are = at equilibrium.

The best affordable point is C. At point C, on budget line and also on the highest attainable indifference curve.
To derive demand curve for bottled water:

- Change the price of water
- Shift the budget line
- Work out the new best affordable point
Deriving the demand curve (for the x good)
The Demand Curve

Using best affordable (equilibrium) points

When the price of water is $1 a bottle, best affordable point is C in part (a) and at point A on the demand curve in part (b).

When the price of water is 50¢ a bottle, best affordable point is K in part (a) and at point B on the demand curve in part (b).
(a) Change in consumer equilibrium

(b) Demand curve
Where we are

- Have now derived the demand curve from the complete theoretical story – from indifference curves
- Know two decision rules for consumer equilibrium, equal MU/$ and the graphical equivalent of the point of tangency of the budget line and an indifference curve
- Both give point of maximum affordable utility
in a last-ditch effort to win back public goodwill,

BP names a new CEO
On to the theory of the firm: what do bosses do?

- What is the goal of the firm?
  - MAX \( TT \)

- What do they do to reach this goal?
  - MAX \( TR - TC \)
"That'll be £57.50, Potter."
The Firm’s Goal

Tricky Bit: Accounting Cost and Profit

An accountant measures cost and profit to ensure that the firm pays the correct amount of income tax and to show the bank how the firm has used its bank loan.

Economists predict the decisions that a firm makes to maximize its profit. These decisions respond to *opportunity cost* and *economic profit*. 
"And here is where we stooped to the level of the competition."
Opportunity Cost in Production

The amount that the firm must pay the owners of the factors of production it employs to attract them from their best alternative use.

So a firm’s opportunity cost of production is the cost of the factors of production it employs.
Another Tricky Bit: Explicit and Implicit Costs

Explicit cost is a cost paid in money.

Implicit cost is an opportunity cost incurred by a firm when it uses a factor of production for which it does not make a direct money payment.

The two main implicit costs are economic depreciation and the cost of using the firm owner’s resources.
So what is profit? The economists’ view

Core concept is normal profit: the return to entrepreneurship.

Normal profit is part of a firm’s opportunity cost because it is the cost of the entrepreneur not running another firm.
How this all works

Opportunity cost is

Also need new cost distinction

1. Explicit costs and

2. Implicit cost (including normal profit).
Accountants measure cost as the sum of explicit costs and accounting depreciation.

Accounting profit is total revenue minus accounting costs.
CEOs pay as ratio to production workers

Source: Authors’ analysis of Wall Street Journal/Mercer, Hay Group (2010).
Note: Point markers denote where ratio is known.
A new distinction: short vs long run

The Short Run: Fixed Plant

The short run is a time frame in which the quantities of some resources are fixed.

Can usually change the quantity of labor it uses but not the quantity of capital.

The Long Run: Variable Plant

The long run is a time frame in which the quantities of all resources can be changed.

A sunk cost is irrelevant to the firm’s decisions.
Non-wage labor costs

http://stateofworkingamerica.org/charts/health-and-pension-coverage-college-graduates/
To increase output with a **fixed** plant, a firm must increase the **quantity of labor** it uses.

We describe the relationship between output and the quantity of labor by using three related concepts:

- Total product
- Marginal product
- Average product
Total product (TP) is the total quantity of a good produced in a given period.

Total product is an output rate—the number of units produced per unit of time.

Total product increases as the quantity of labor employed increases.
Note similarity to total utility!

Points A through H on the curve correspond to the columns of the table.

The \( TP \) curve is like the budget line: separates attainable points and unattainable points.
Marginal product: note role of labor!

**Marginal product** is the change in total product from a one-unit increase in the quantity of labor employed.

Marginal product tells us the contribution to total product of adding one more worker.

When the quantity of labor increases by more (or less) than one worker, **calculate** marginal product as

\[
\text{Marginal product} = \frac{\text{Change in total product}}{\text{Change in quantity of labor}}
\]
We can illustrate marginal product as the orange bars that form steps along the total product curve.

The height of each step represents marginal product.