MANAGERIAL ECONOMICS

Dr. M. S. Rama Devi

A Definition:

The application of mathematical, statistical and decision-science tools to economic models to solve managerial problems

Some managerial problems:

- What product to produce
- What price to charge
- Where/how to get financing
- Where to locate
- How to advertise
- What method of production to use
- Whether or not to invest in new equipment

Managers' Objectives

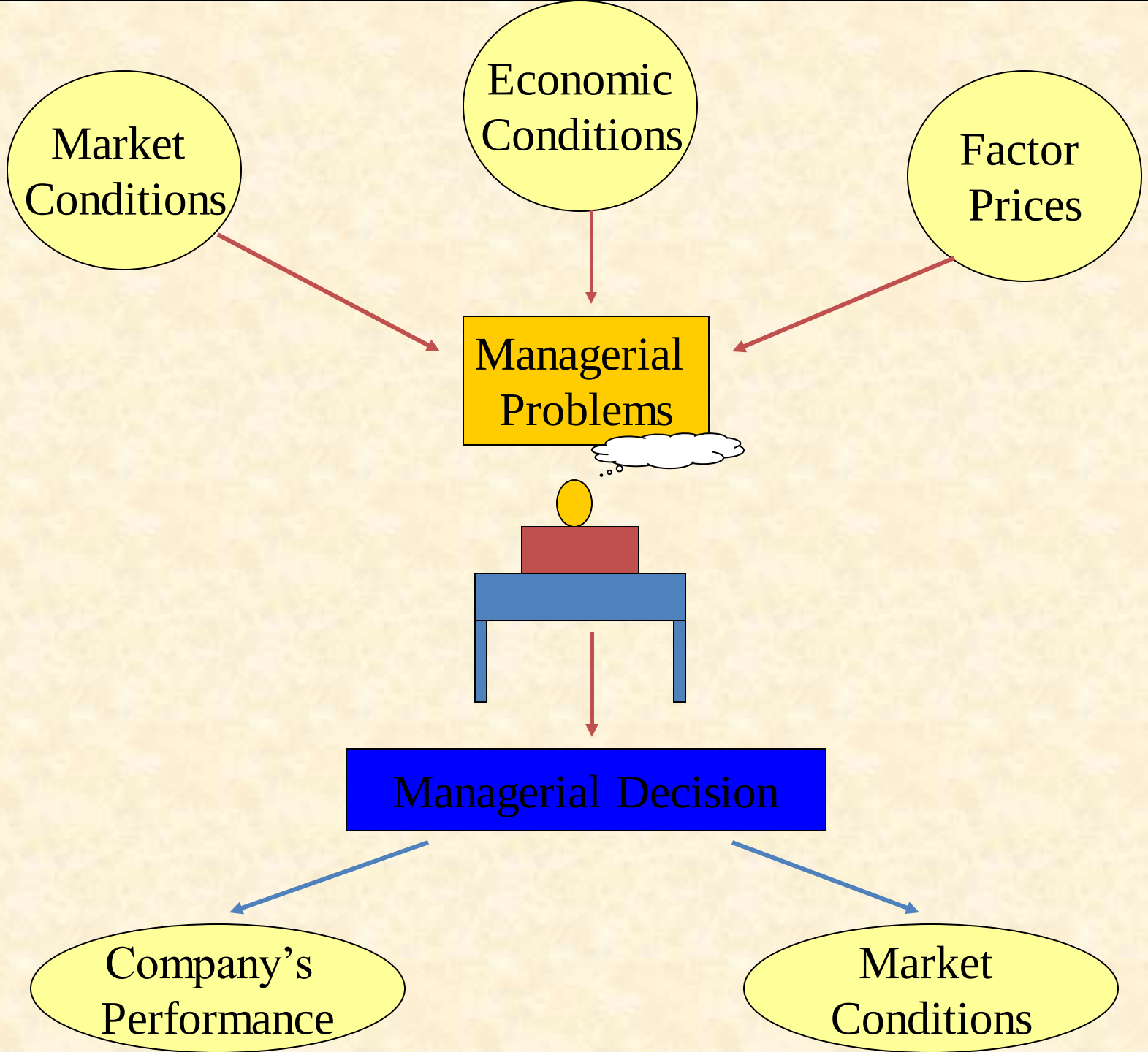
- Maximizing the value of the firm
  (Through profit maximization)

- Alternative objectives:
  =>Market share maximization
  =>Growth Maximization
  =>Maximizing their own benefits
  =>Stisfice vs. optimize

Decision Making Process

- Identifying the problem or the decision to be made

  Abstraction: Identifying the relevant factors in the problem and formulating the problem into a manageable set of questions/problems (while abstracting from irrelevant factors)
- Identifying alternative solutions to each problem
- Using relevant data to evaluate alternative solutions
- Choosing the best solution consistent with the firm's objective


Market Conditions
Economic Conditions
Factor Prices
Managerial Problems
Managerial Decision
Company's Performance
Market Conditions

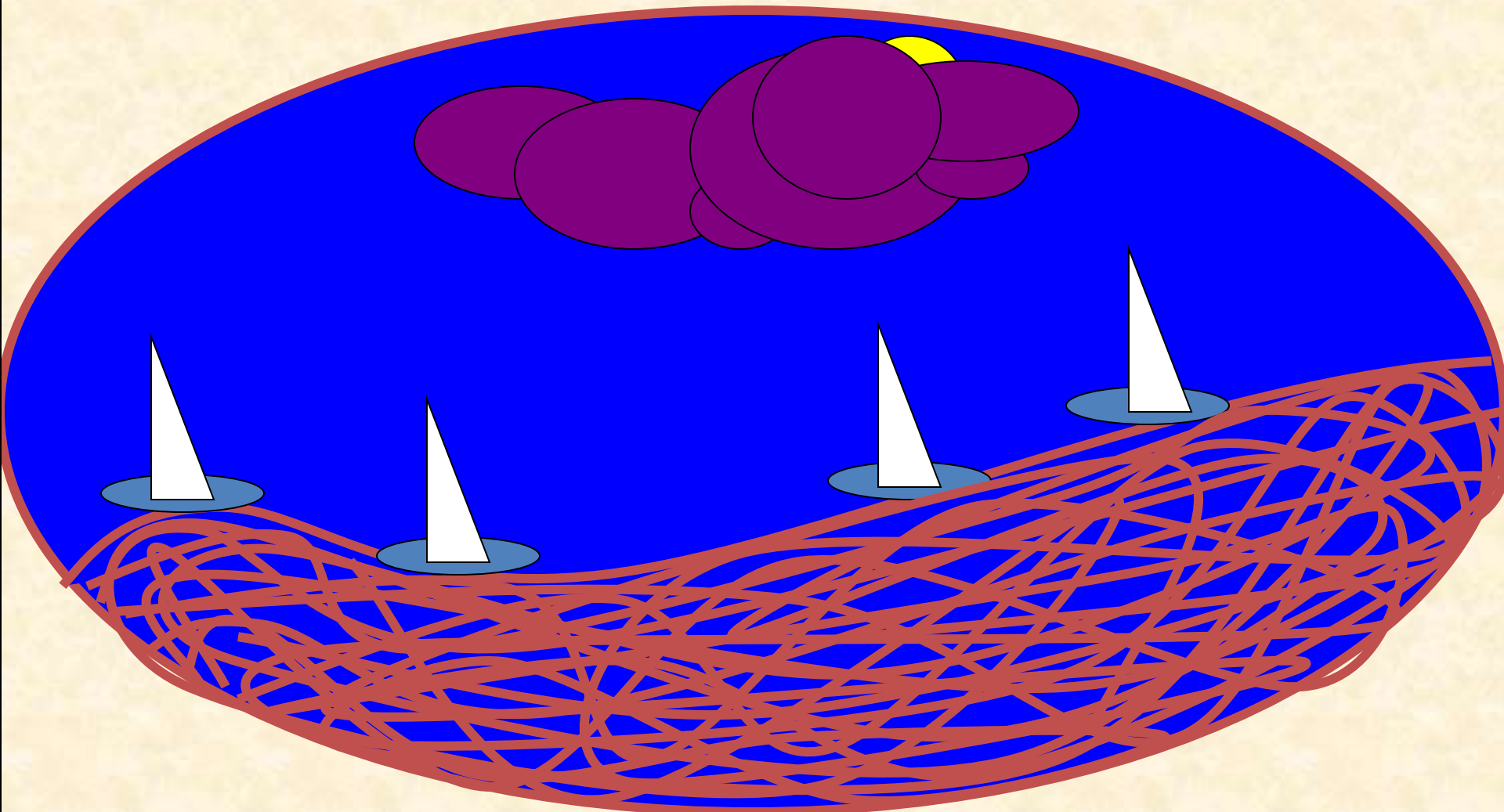
Consider the following news headlines:

- Gateway cuts jobs: PC maker to trim 15 percent of staff, expects shortfall in third quarter.
- U.S. consumers lost confidence in August.
- The International Monetary Fund will cut its global economic growth forecast for this year to 2.8 percent.
- Coca-Cola Co., facing a stiff challenge from its arch rival PepsiCo Inc. in the fast-growing alternative drinks market, may be preparing to acquire the Nantucket Nectars line of juice and tea products, analysts said Tuesday.

The ups and downs:

	High	Low	Last	PE
MSFT	31	21	30	24
IBM	101	72	99	16
Mot	26	17	19	13.3
AT&T	37	24	36	19
GM	36	19	32	NA
KFT	36	28	34	17.9
MCD	45	31	43	15.4
WMT	52	42	47	18.14

Macroeconomics, Microeconomics and and Managerial Decision Making



Optimization and Value Maximization

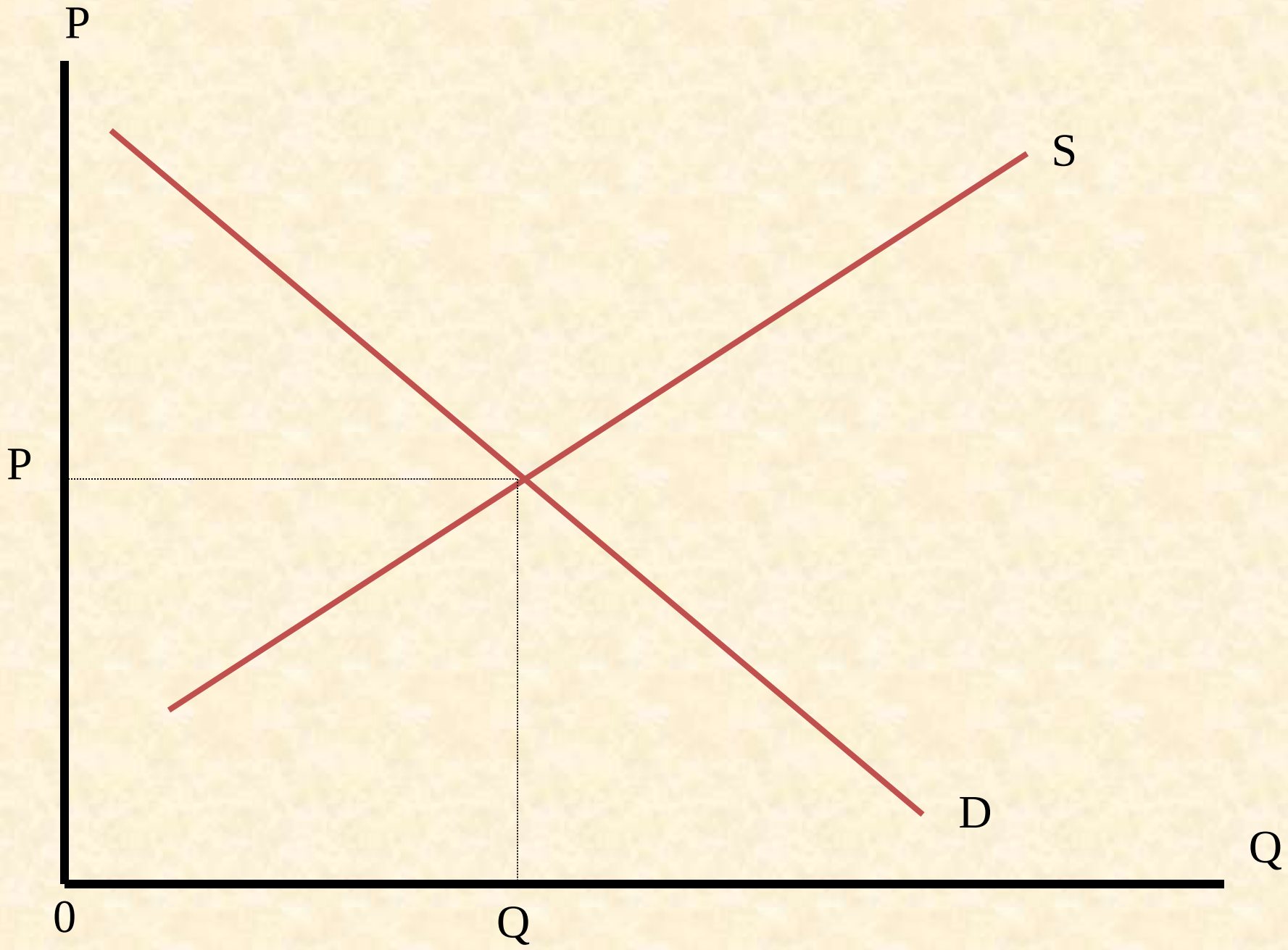
- The value of a firm is the sum of the discounted future profits of the firm.

$$\text{Value} = \sum \frac{\text{Profit}_t}{(1+i)^t} = \sum \frac{TR_t - TC_t}{(1+i)^t}$$

- Functional Relationship

$TR = f(Q) = P.\,Q$

$TC = g(Q)$


P
S
P
D
Q
0
Q

Demand : A definition

- Demand: A quantity of a good or service a buyer (or buyers) would buy under a ***certain*** set of conditions
- Demand curve is a curve showing the quantities of a good or service a buyer (or buyers) would buy at ***various*** prices, ceteris paribus
- Quantity demanded: The quantity of a good a buyer (or buyers) would be willing and able to buy at a ***specific*** price, ceteris paribus

Supply: A definition

- Supply: A quantity of a good or service a producer (or producers) would be willing to produce and offer to the market for sale under a ***given*** set of conditions
- Supply curve: A curve showing the ***quantities*** of a good or service a producer (or producers) would produce and offer to the market for sale at ***various*** prices
- Quantity supplied: The quantity of a good or service a producer (or producers) would produce and offer for sale to the market at a ***specific*** price, ceteris paribus

Why do we study supply and demand?

We assume, generally, firms are value maximizers, realizing that the value of a firm is function of its (expected) future profits.

Profit = TR - TC

TR = P . Q

==> What are the factors that determine p and Q?

==> What are the elements determining a firm's costs?

Supply and Demand Schedule

Price	Supply	Demand
$ 0.00	----	670
1.00	210	470
1.25	290	420
1.50	370	370
1.75	450	320
2.00	530	270
2.25	610	220
2.50	690	170

Supply and Demand Equations

- Demand:

  $Qd = 670 - 200\,P$

  $P = 3.35 - .005\,Qd$

- Supply:

  $Qs = -110 + 320\,P$

  $P = .34375 + .003125\,Qs$

Shifts in supply and demand curve:

- A change in any non-price factor in the demand function would result in a shift in the curve: changes in the intercepts.

- A change in any non-price factor in the supply function would result in a shift in the curve: changes in the intercepts.

Demand and Revenue

- Recall that:

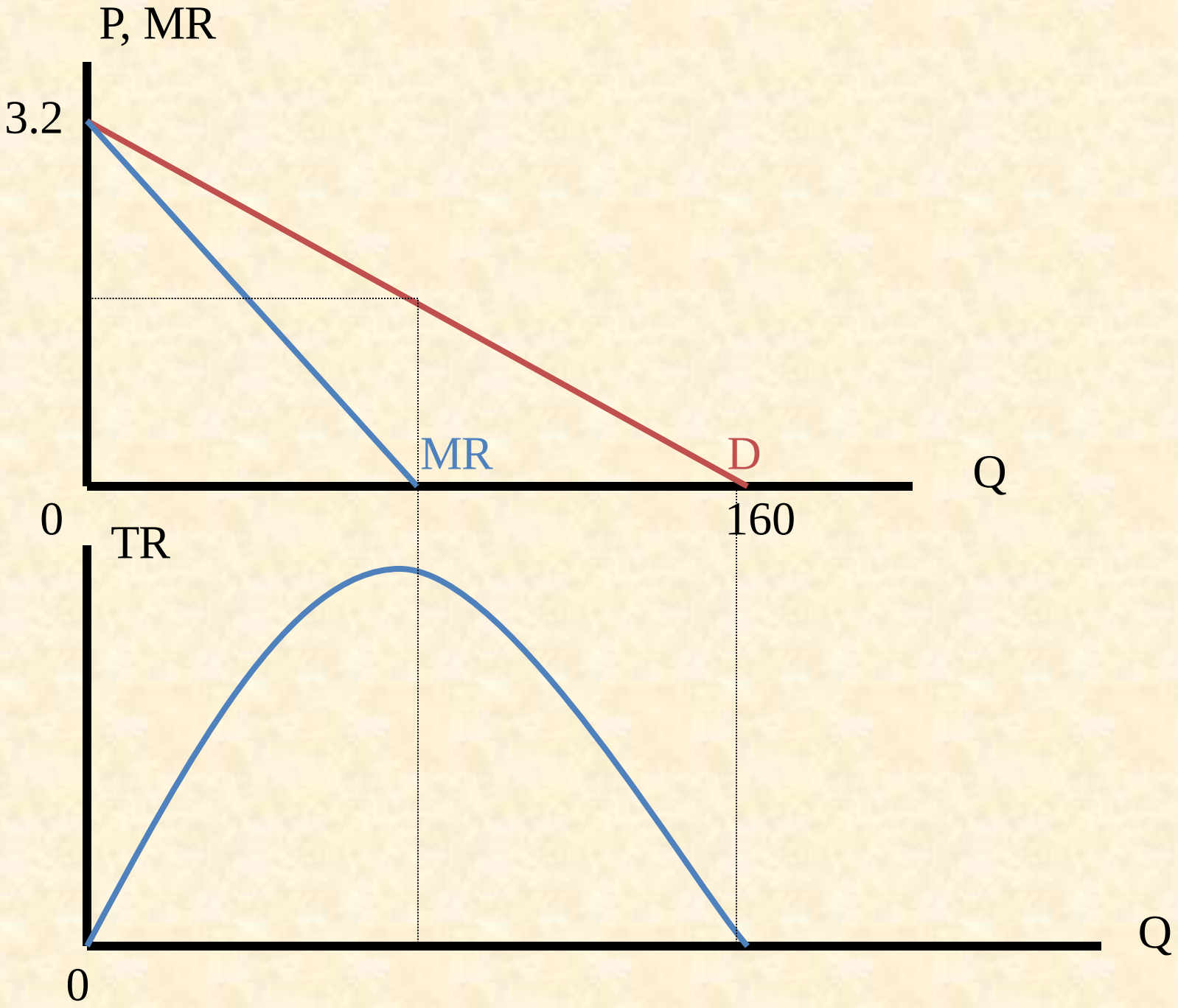
$$TR = \text{Price} \times \text{Quantity} = P \,.\, Q$$

If $P = f(Q) = 3.2 - .02\,Q$,

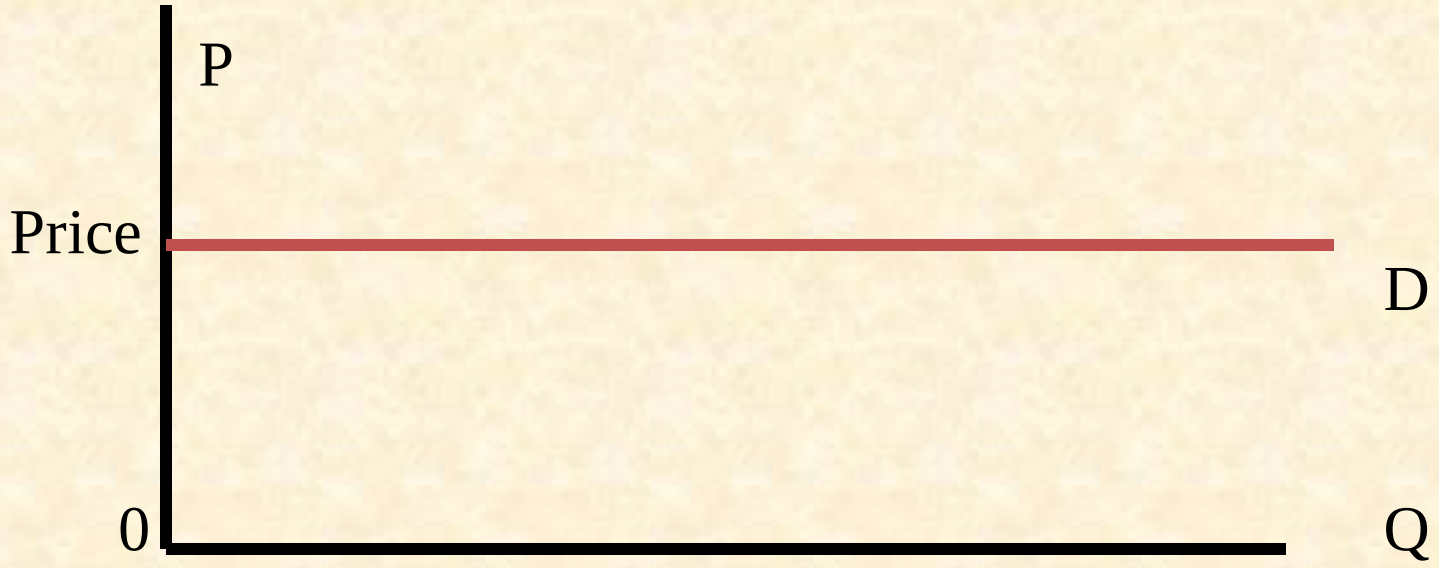
we can write: $TR = (3.2 - .02Q).Q$

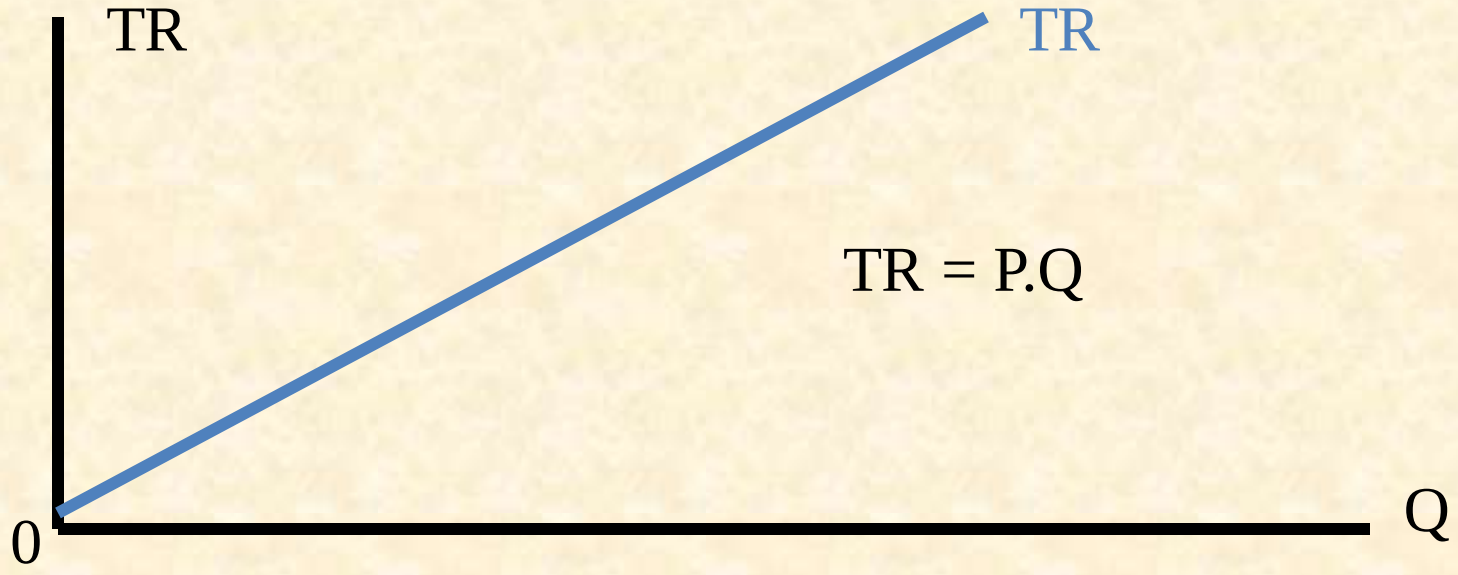
Or, $$TR = 3.2\,Q - .02\,Q^2$$

(a quadratic function)

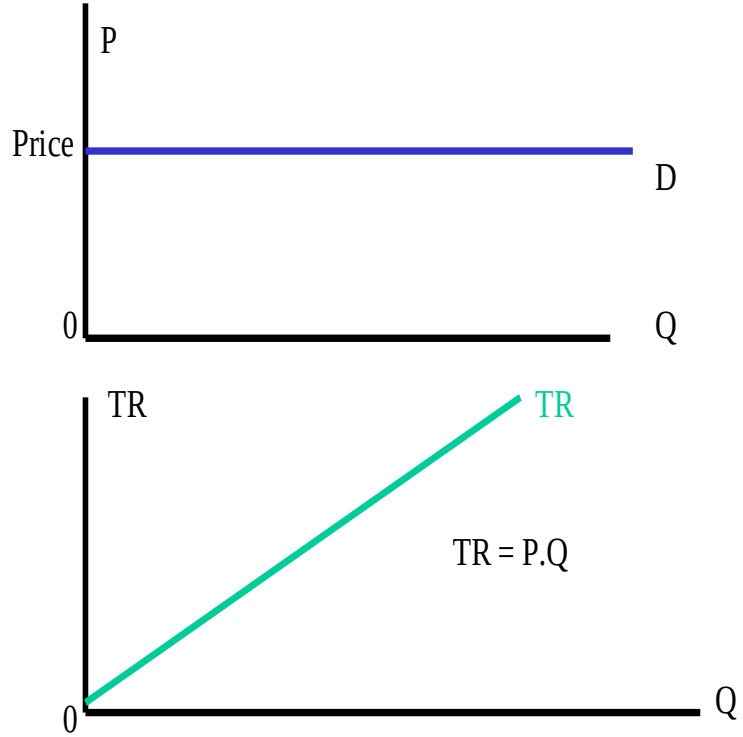

P, MR
3.2
MR
D
Q
0
160
TR
Q
0

The case of a horizontal demand curve:





The case of a horizontal demand curve:



In this case the price, P, is a constant.

$$TR = P.\,Q$$

$$MR = \frac{dTR}{d\,Q} = \frac{d(P.Q)}{d\,Q} = P$$

==> P = MR

Why is the demand curve generally downward-sloping?

The Consumer theory :

- The indifference curve
- The Budget line

The Consumer Theory

- The concept of “utility”
- Cardinal measurement of utility
- Ordinal measurement of utility
- Marginal utility
- The principle of diminishing marginal utility
- Marginal utility and consumer choice
- Consumers’ optimizing behavior
- The Consumer’s optimizing rule

>> the cardinal approach

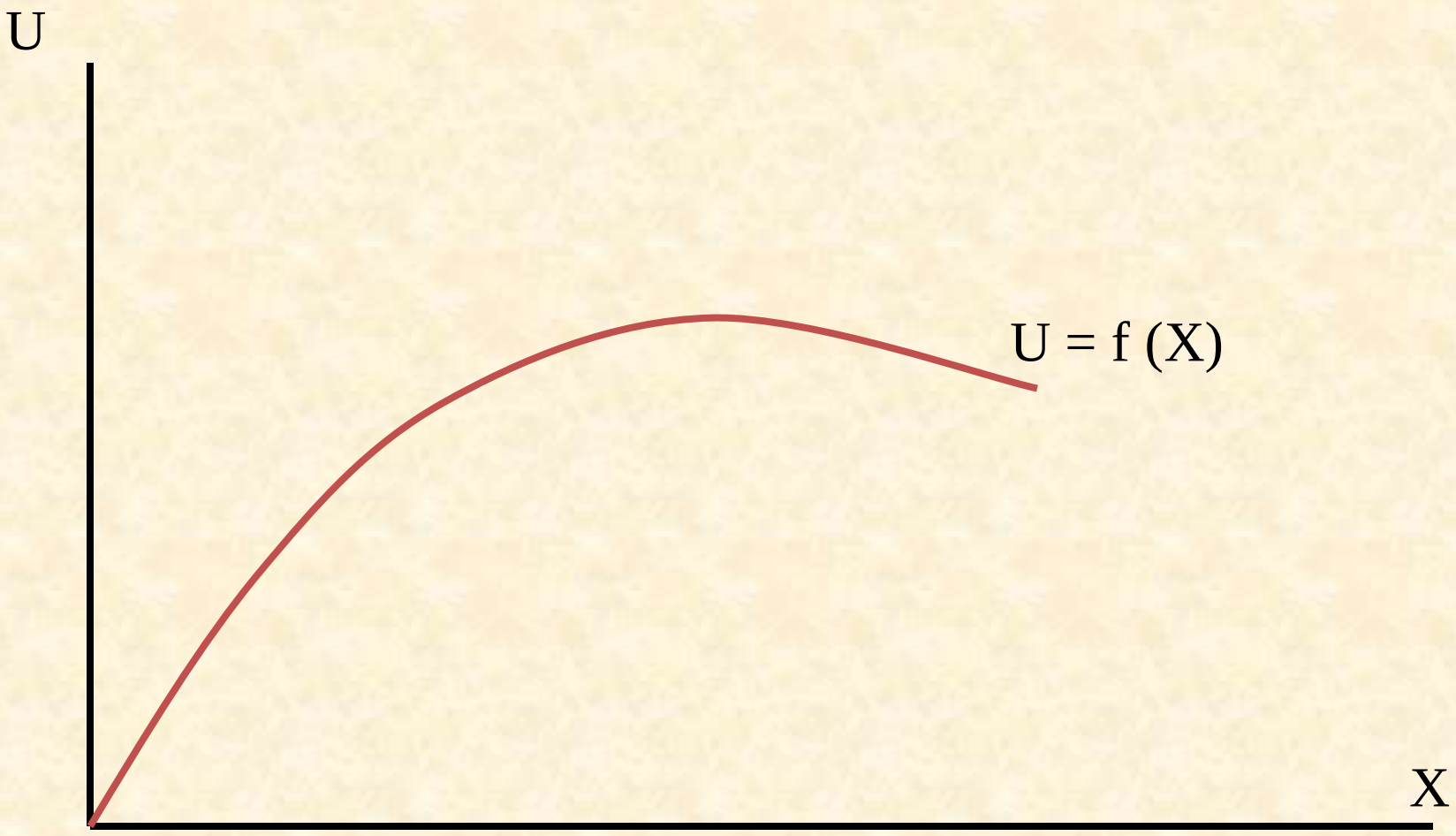
>> the ordinal approach

Utility

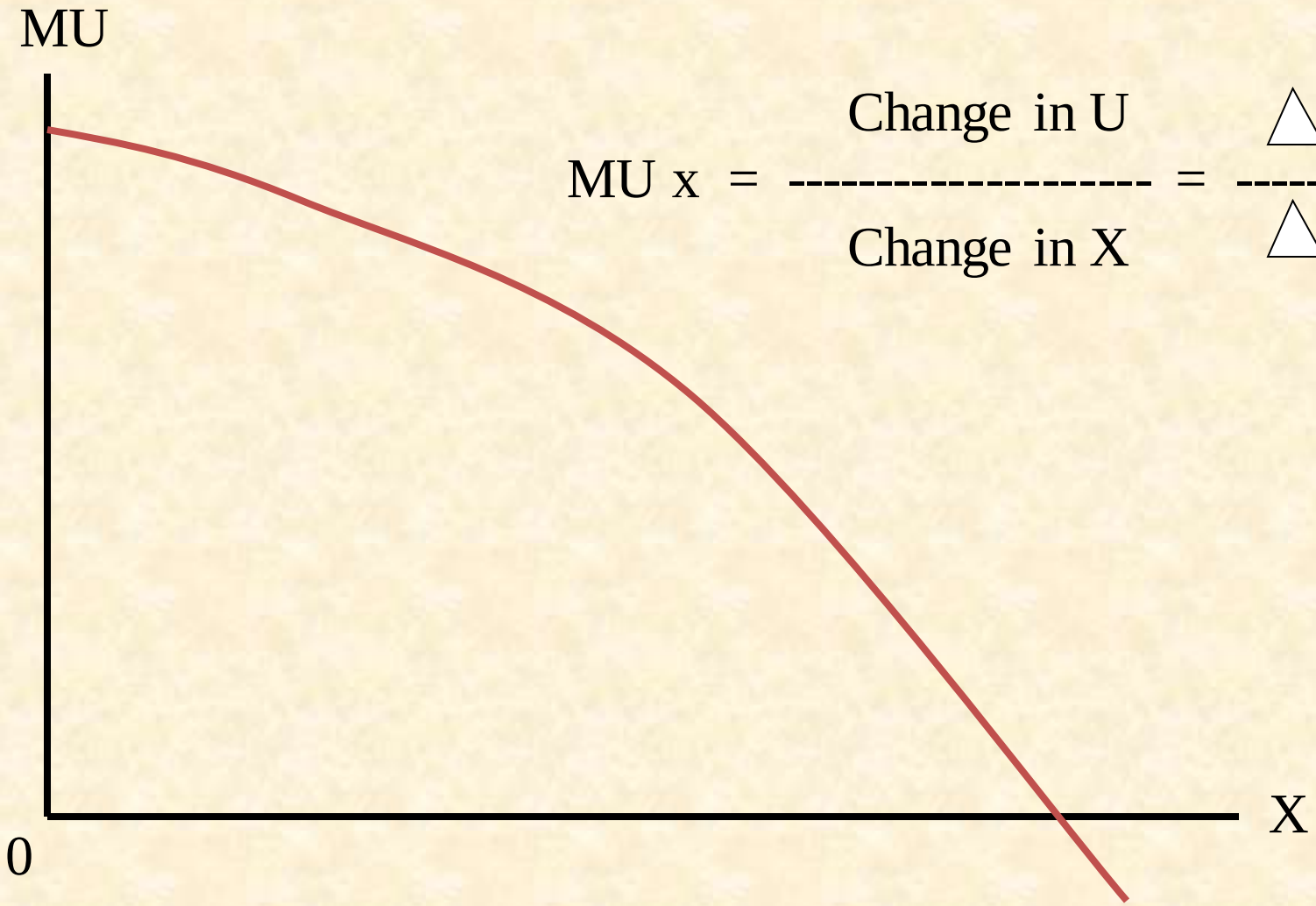
The satisfaction or pleasure a consumer derives from the consumption or possession of a good (or service) or an activity (or lack thereof), over a certain span of time.

Note: An economic “bad” is an object, a condition, or an activity that brings on harm or displeasure to a consumer. A consumer derives utility from having an economic “bad” reduced or eliminated.

Diminishing Marginal Utility



Marginal Utility



$$MU_x = \frac{\text{Change in U}}{\text{Change in X}} = \frac{\Delta U}{\Delta X}$$

Consumer Choice

Constrained by her income, to maximize her total utility a consumer allocates her income among different goods in such a way that the utility derived from the last dollar spent on each good would be equal to that each of the other goods.

The principle of diminishing marginal utility:

- As a consumer consumes more and more of a good, beyond a certain level, the utility of each additional unit of it (marginal utility) begins to decrease.
- As a consumer consumes more and more of a good, beyond a certain level, each additional unit of that good becomes less dear to him/her

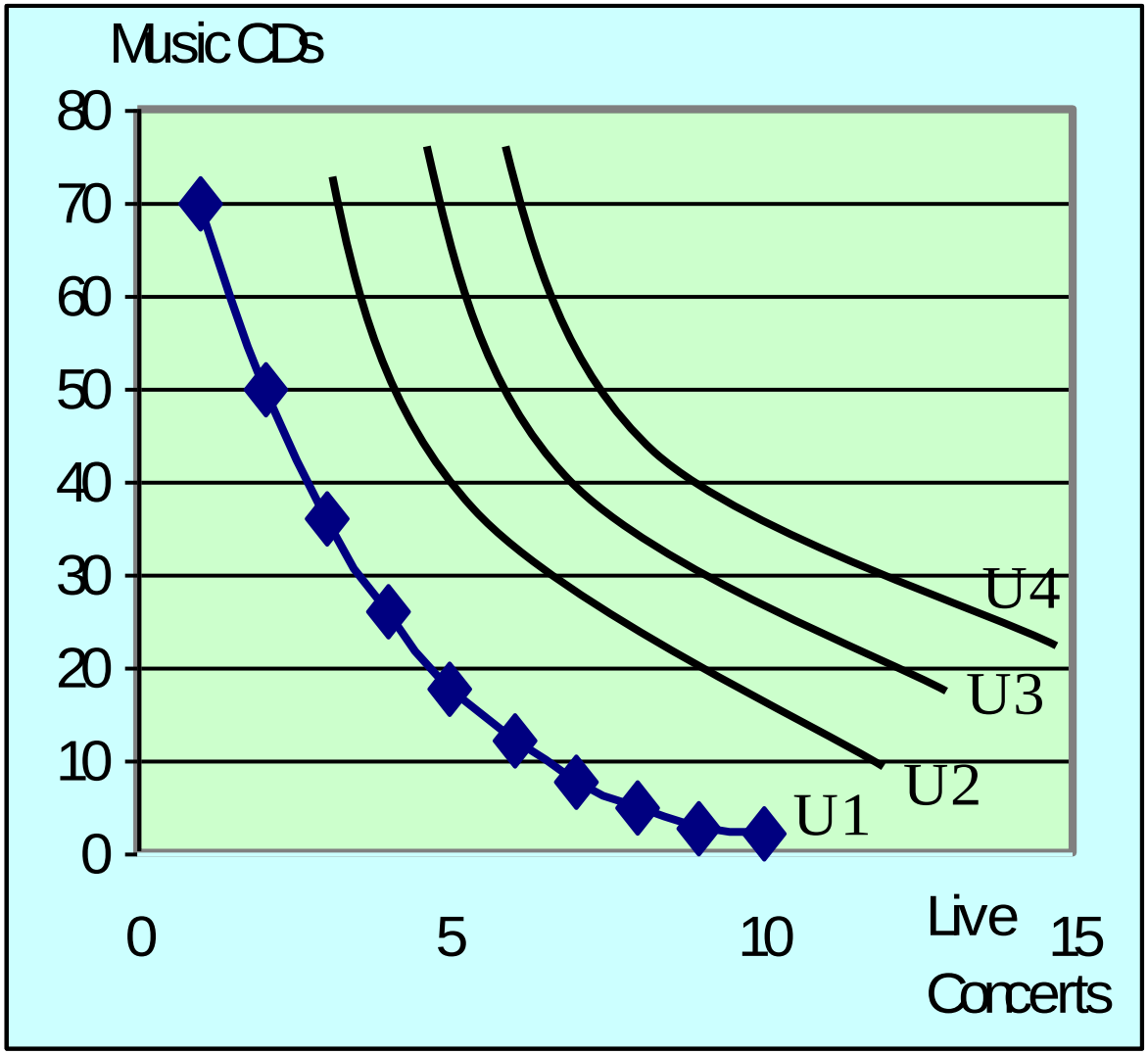
An Indifference Curve: Definition

- An indifference curve is a curve showing all the quantity mixes of two goods from which the consumer derives the same level of utility.
- An indifference curve is convex to the origin, reflecting the principle of diminishing marginal utility.
- The slope of an indifference curve measures the marginal rate of substitution, MRS.

Utility and Indifference Curves

AN INDIFFERENCE SCHEDULE

Live Conc.	Music CDs
10	2
9	3
8	5
7	8
6	12
5	18
4	26
3	36
2	50
1	70



Properties of an indifference curve

- Generally, negatively sloped, reflecting marginal rate of substitution
- Convex to the origin, reflecting diminishing marginal utility
- Two indifference curves cannot cross
- Special case: a positively sloped indifference curve

Marginal Rate of Substitution

- Definition: The rate at which a consumer is willing to substitute one good for another good while remaining at the same level of satisfaction. That is the amount of good X needed to replace one unit of (lost) good Y to keep the consumer's level of satisfaction (utility) unchanged.

- MRS = Slope of the indifference curve

Again suppose a consumer consumes two goods; X and Y

$$U = f(X, Y)$$

As X increases => U will increase

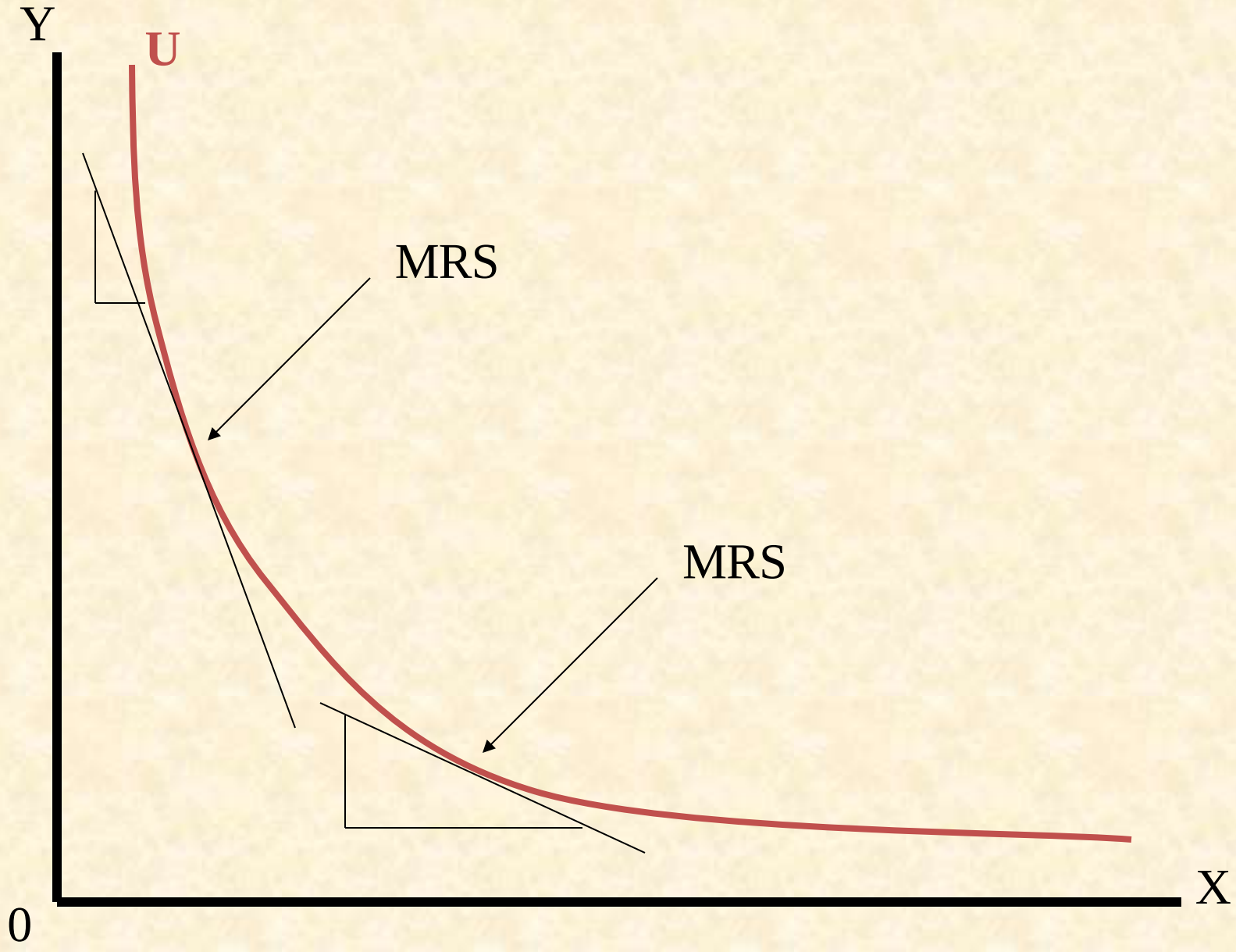
As Y increases => U will increase

Recall:

$$MU_x = \frac{\Delta U}{\Delta X} \qquad MU_y = \frac{\Delta U}{\Delta Y}$$

Along any given indifference curve $\Delta U = MU_x \Delta X + MU_y \Delta Y = 0$

$$\text{Slope of an indifference curve} = \frac{\Delta Y}{\Delta X} = -\frac{MU_x}{MU_y} = MRS$$


Y
U
MRS
MRS
X
0

Budget Line

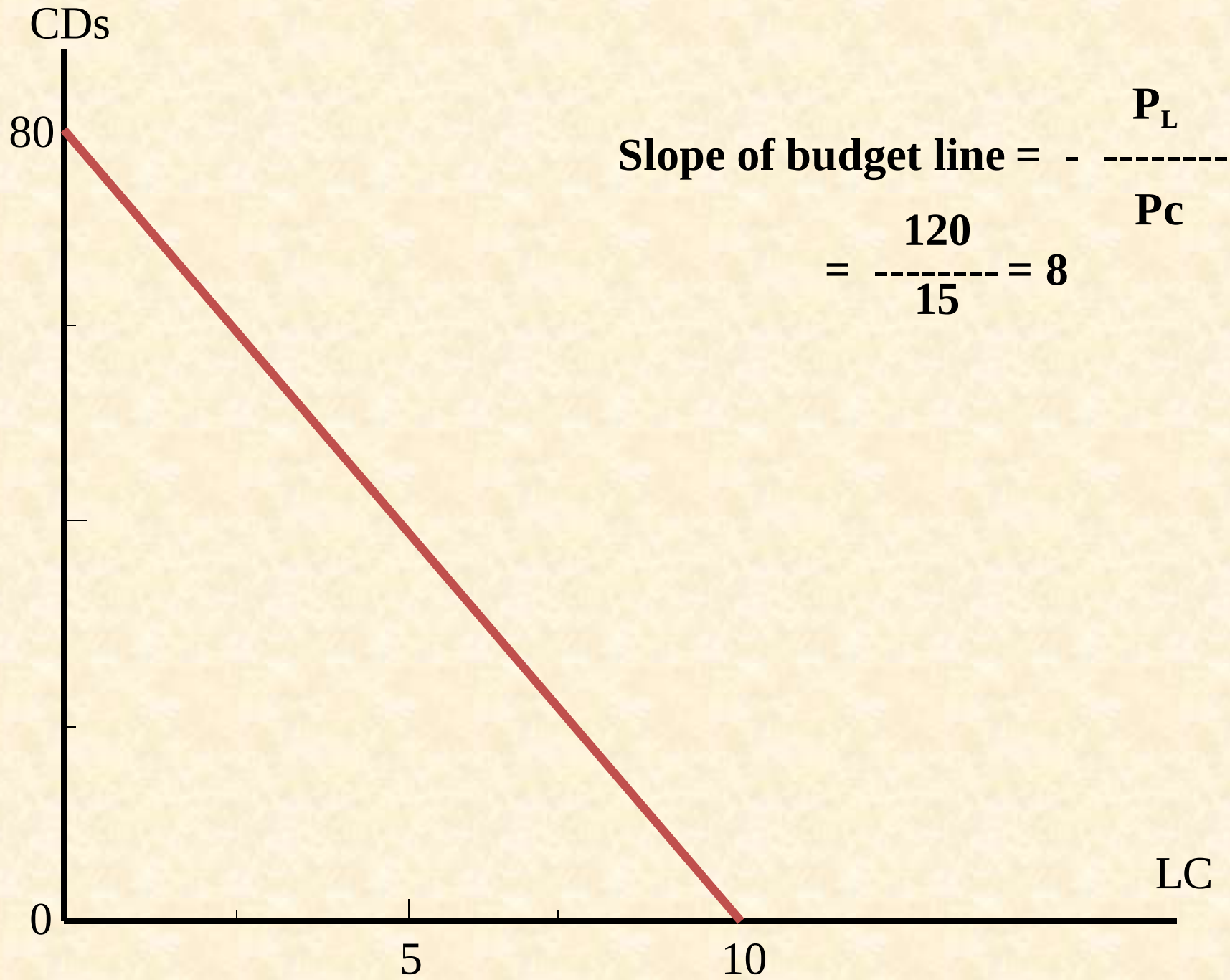
A line showing all combinations of the quantities of two goods a consumer can buy with a given amount of income (budget).

Assuming a consumer is spending all her income on two (symbolic) consumer goods: CDs and live concerts,

$$\text{Income} = P_c \cdot Q_c + P_L \cdot Q_L$$

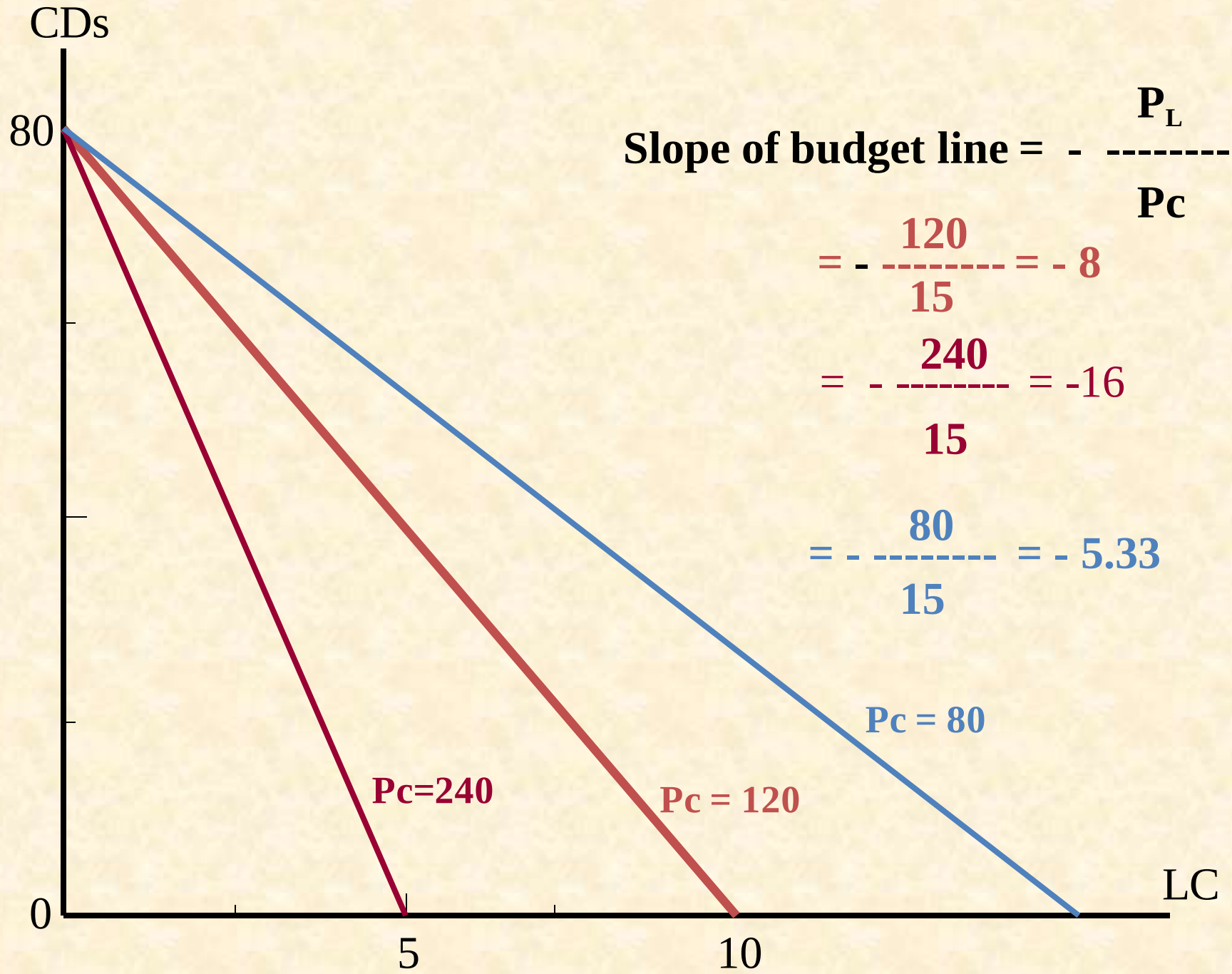
$P_c = 15$, $P_L = 120$, Income = 1200

CD intercept = 80 LC intercept = 10



$$\text{Slope of budget line} = -\frac{P_L}{Pc}$$

$$= \frac{120}{15} = 8$$

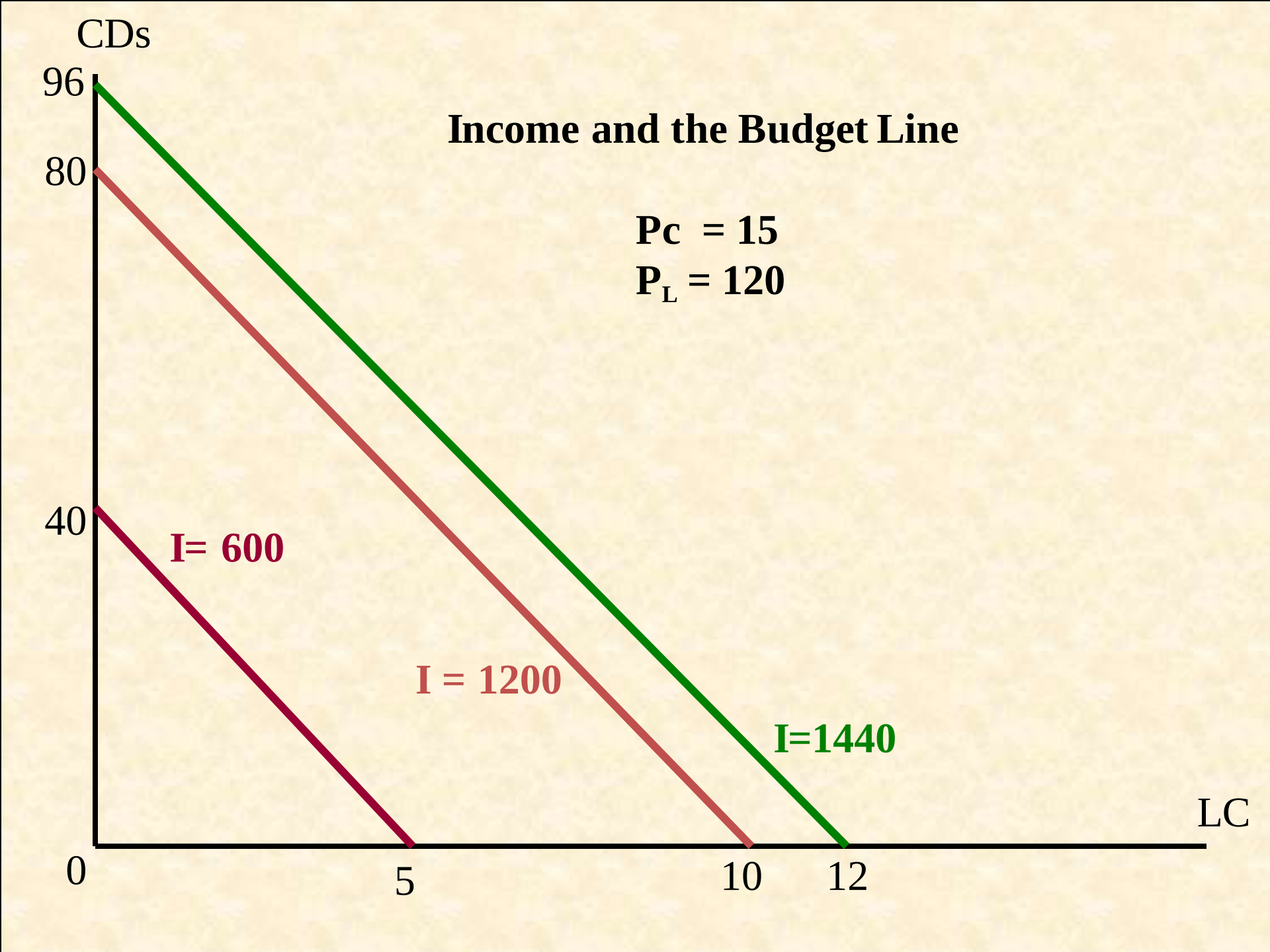


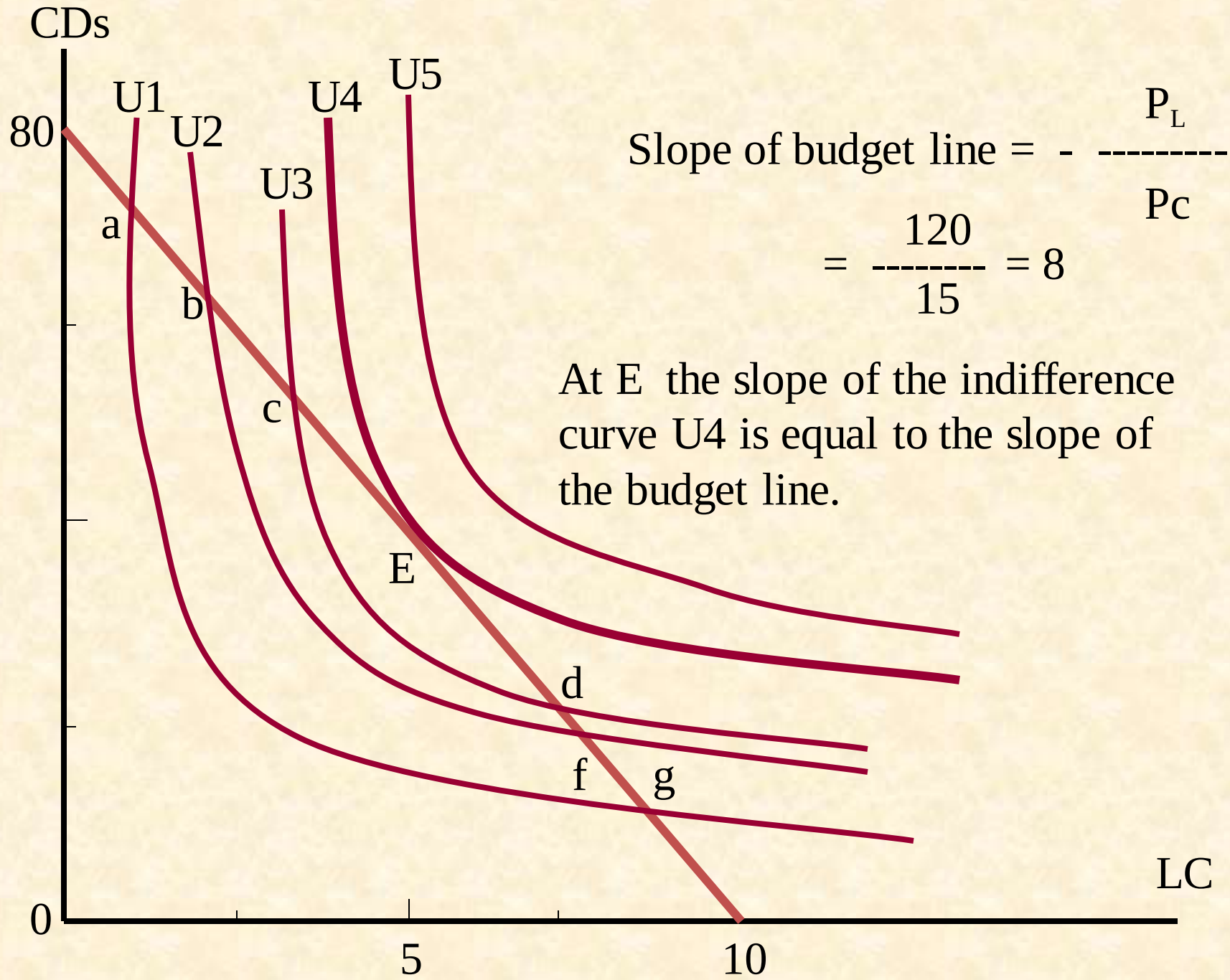
$$\text{Slope of budget line} = -\frac{P_L}{Pc}$$

$$= -\frac{120}{15} = -8$$

$$= -\frac{240}{15} = -16$$

$$= -\frac{80}{15} = -5.33$$


CDs
96
80
40
0
5
10
12
LC
Income and the Budget Line
Pc = 15
P_L = 120
I= 600
I = 1200
I=1440



$$\text{Slope of budget line} = -\frac{P_L}{Pc}$$

$$= \frac{120}{15} = 8$$

At E the slope of the indifference curve U4 is equal to the slope of the budget line.

Utility Maximization

Recall that:

$$\text{Slope of the indifference curve} = -\frac{MU_L}{MUc} = MRS$$

$$\text{Slope of the budget line} = -\frac{P_L}{Pc}$$

$$\text{At point E: } -\frac{P_L}{Pc} = -\frac{MU_L}{MUc} = MRS$$

Elasticity

A general definition:

Elasticity is a standardized measure of the sensitivity of one (dependent) variable to changes in another variable.

Price elasticity of demand:

A measure of the sensitivity of the quantity demanded a good to changes in the price of that good.

Measuring Elasticity

- Elasticity is measured by the ratio between the percentage change in on variable and the percentage change in another variable:

$$\text{Elasticity} = \frac{\text{Percentage change in Y}}{\text{Percentage change in X}}$$

$$= \frac{\Delta Y / Y}{\Delta X / X}$$

Elasticity of Demand

- The (market) demand for a good is affected by numerous factors: price, income, taste, population, weather, expectations, population demographics, etc.
- The degree of sensitivity or responsiveness of the demand to changes in any of the factors affecting it can be measured in terms of "elasticity".

$$E_z = \frac{\text{percentage change in } Qd}{\text{percentage change in } X}$$

Measuring Elasticity

Measuring a change in percentage terms:

$$\% \text{ change in } Y = \frac{Y_2 - Y_1}{Y_1} = \frac{Y_1 - Y_2}{Y_2}$$

Y1 = 80

Y2 =100

$$\text{Arc } \% \text{ change} = \frac{Y_2 - Y_1}{\frac{Y_2 + Y_1}{2}}$$

Measuring Elasticity

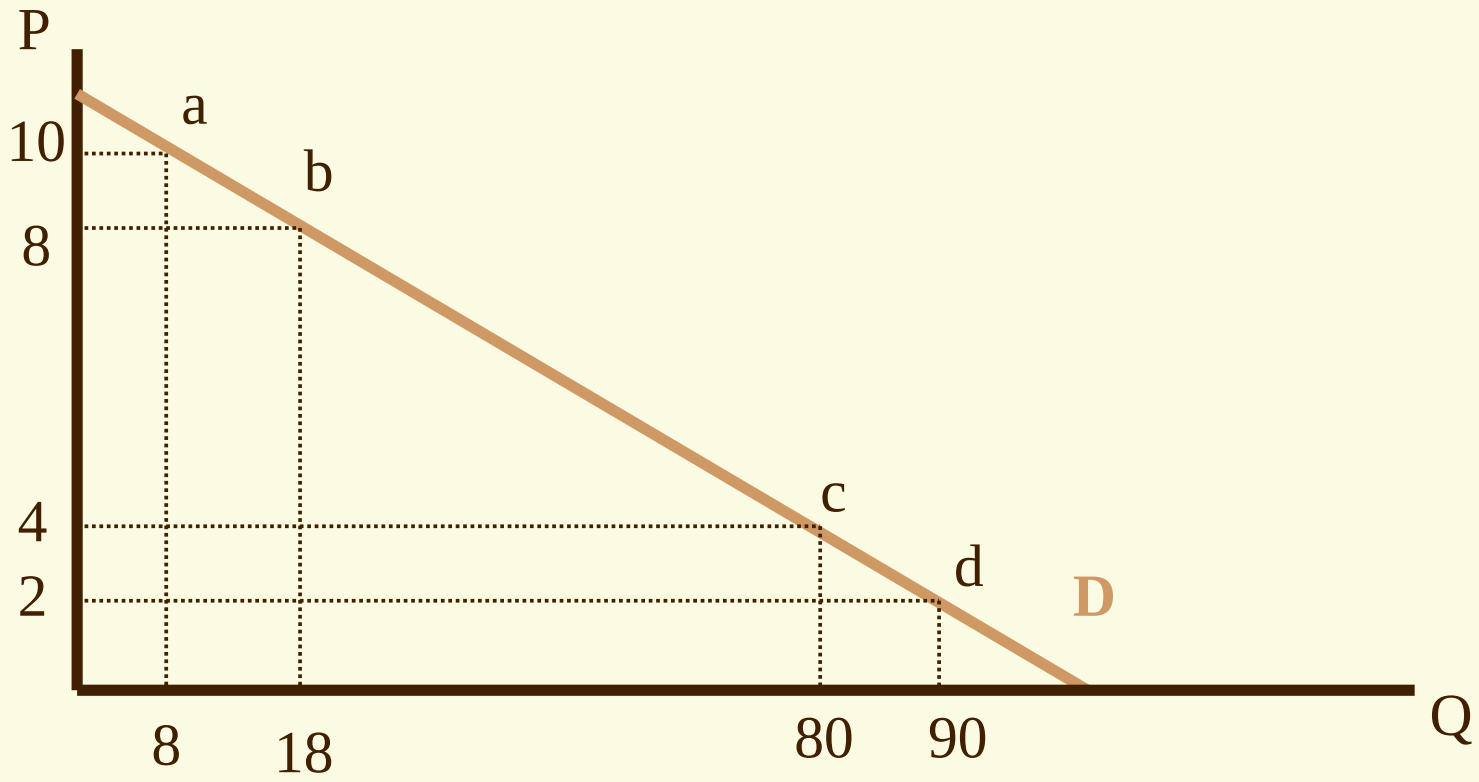
$$Ez = \frac{\dfrac{\text{Change in } Q_x}{Q_{x1}}}{\dfrac{\text{Change in } Z}{Z_1}}$$

$$(Arc)Ez = \frac{\dfrac{\text{Change in } Q_x}{Qx1 + Qx2}}{\dfrac{\text{Change in } Z}{Z_1 + Z_2}}$$

Price Elasticity of Demand

Definition: A measure of the responsiveness of quantity demanded of a good to changes in its price.

$$Ep = \frac{\dfrac{Q_{x2} - Q_{x1}}{Q_{x1} + Q_{x2}}}{\dfrac{P_2 - P_1}{P_1 + P_2}}$$



Ep (a --- b) = (10/8)/(-2/10) = -6.25

Ep (c ---d) = (10/80)/(-2/4) = -.25

Arc (Price) Elasticity

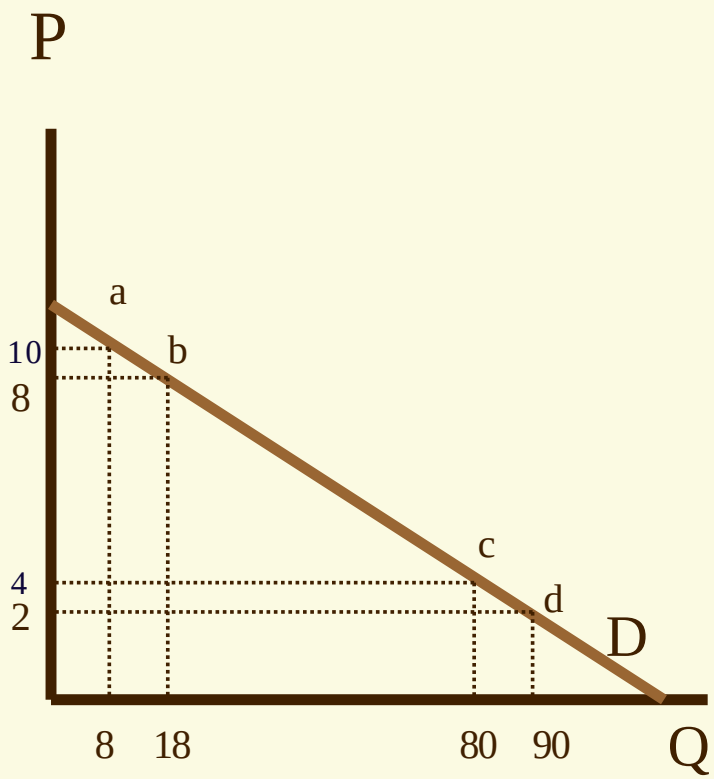
Note that if we *increased* the price,

(from 8 to 10 or 2 to 4)

the original P and Q would be 2 and 8 and 18 and 90, respectively.

Ep = (-10/18)/(2/8) = -2.22

Ep = (-10/90)/(2/2) = -.11



Arc Elasticity

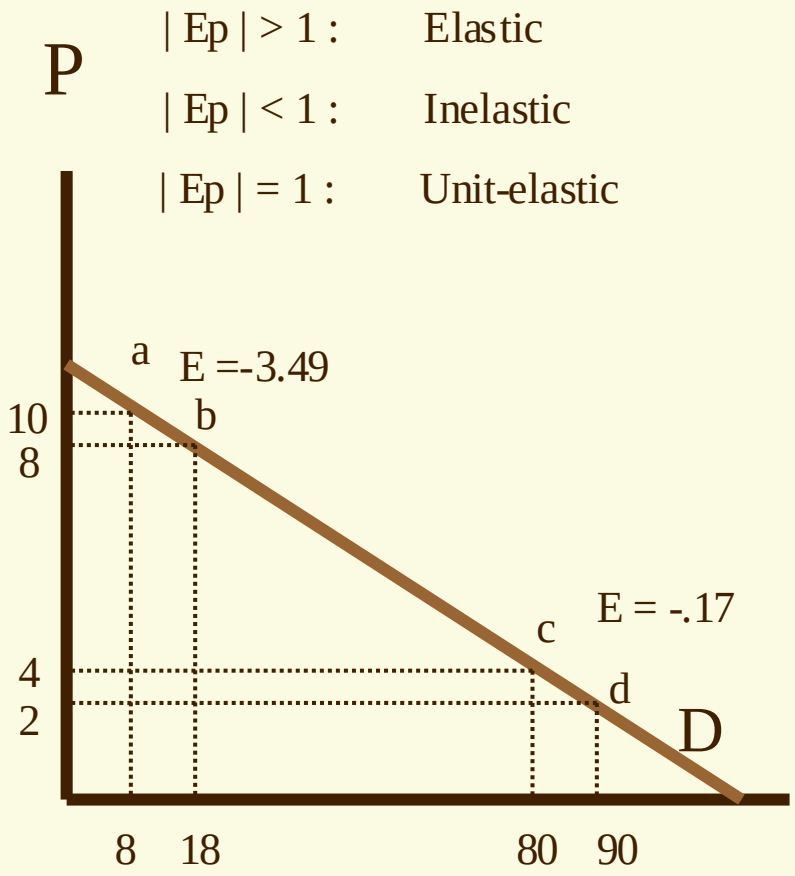
To get the average elasticity between two points on a demand curve we take the average of the two end points (for both price and quantity) and use it as the initial value:

$$Ea = \frac{\dfrac{Q2-Q1}{(Q1+Q2)}}{\dfrac{P2-P1}{(P1+P2)}} = \frac{\dfrac{10}{8+18}}{\dfrac{-2}{10+8}} = -3.49$$

Elasticity and the Price Level

Along a linear demand curve as the price goes up, |elasticity | increases.

Note that between points "a" and "b" the (arc) elasticity of the above demand curve is -3.49, whereas between "c" and "d" it is -.17.



Point Elasticity

$$E = \frac{\dfrac{\Delta Q}{Q_1+Q_2}}{\dfrac{\Delta P}{P_1+P_2}} = \frac{\Delta Q}{\Delta P} \cdot \frac{P_1+P_2}{Q_1+Q_2} = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

Or, $$= \frac{dQ}{dP} \cdot \frac{P}{Q}$$

What Determines Elasticity

- Necessities versus luxuries
  - Eating at restaurants
  - Groceries
- Availability of substitutes
  - Chicken versus beef
- How much of our income a good takes
  - Salt versus Nike sneakers
- The passage of time

Other Elasticity Measures

Recall: "***Elasticity***" is a (standard) measure of the degree of sensitivity (or responsiveness) of one variable to changes in another variable.

- Income Elasticity: a measure of the degree of sensitivity of demand for a good (or service) to changes in consumers' (buyers') income
- Cross Price Elasticity: a measure of the degree of sensitivity of demand for a good (or service) to changes in the price of another good or service

Income Elasticity of Demand

A measure of the degree of responsiveness of **demand** (for a good) to a change in **income**, *ceteris paribus.*

(Shift of the demand curve)

$$E_I = \frac{\dfrac{Q_2 - Q_1}{Q_2 + Q_1}}{\dfrac{I_2 - I_1}{I_1 + I_2}} = \text{ or } = \frac{dQ}{dI} \cdot \frac{I}{Q}$$

Cross (Price) Elasticity

A measure of the degree of responsiveness of the ***demand*** for **one good** (X) to a change in the ***price*** of **another good** (Y):

(Shift of demand curve)

$$Ec = \frac{\dfrac{Q_{x2} - Q_{x1}}{Q_{x2} + Q_{x1}}}{\dfrac{P_{y2} - P_{y1}}{P_{y1} + P_{y2}}} \quad \text{or} \quad = \frac{d\,Qx}{d\,Py} \cdot \frac{Py}{Qx}$$