Elasticity is expressed as a %.

Own price elasticity:

$$E_D = \frac{\%\Delta Q_D}{\%\Delta P} = \frac{\frac{\Delta Q}{\bar{Q}} \times 100}{\frac{\Delta P}{\bar{P}} \times 100}$$

avg of P & Q are used since they are

1) accurate measure of how to think about elasticity

2) applicable over a larger range of price changes

arc price elasticity

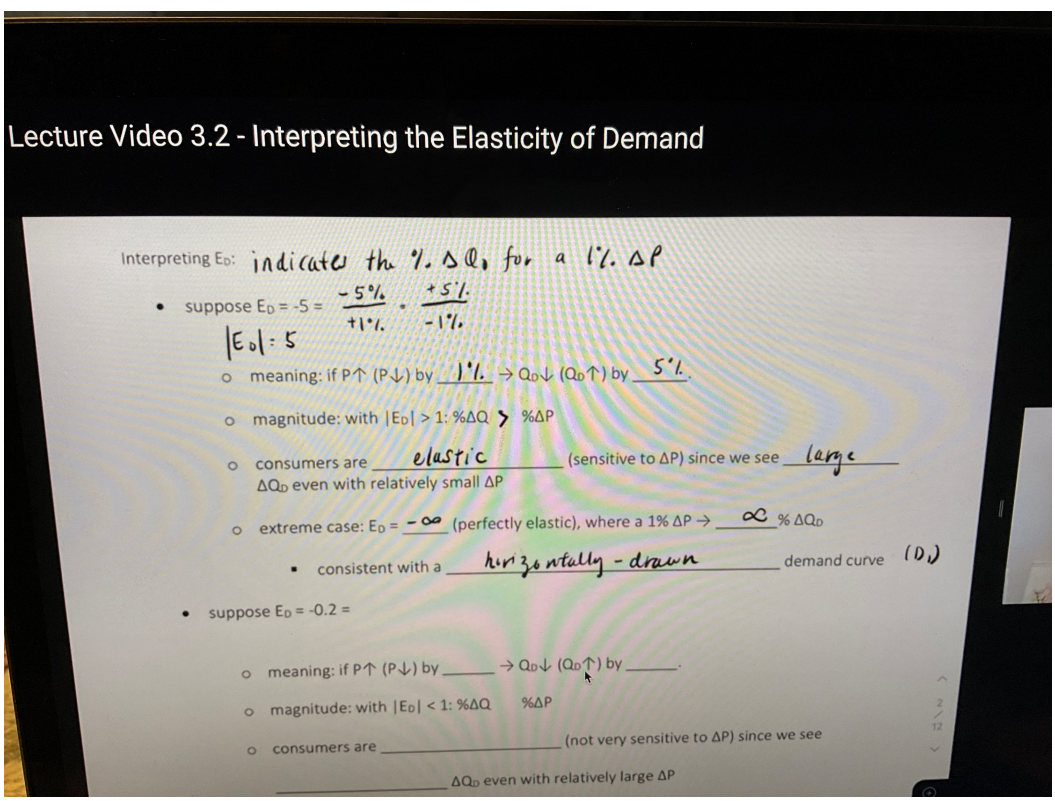
$$= \frac{\Delta Q}{\Delta P} \frac{\bar{P}}{\bar{Q}}$$

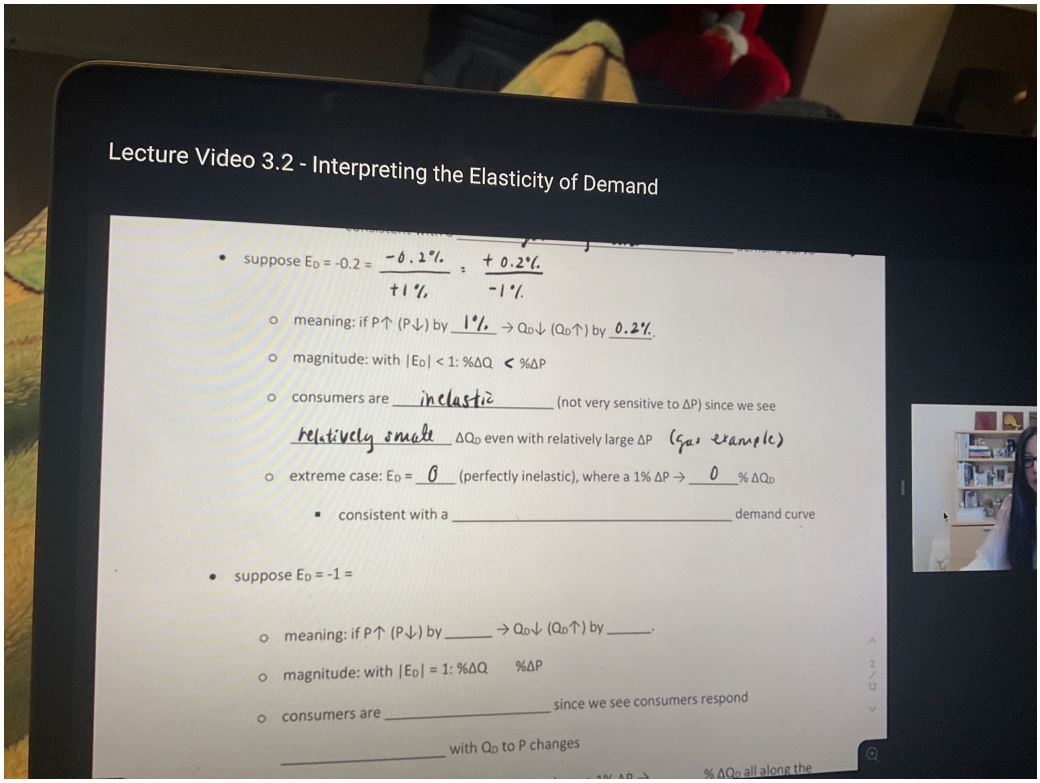
Δ slope of D $= \frac{\Delta P}{\Delta Q}$

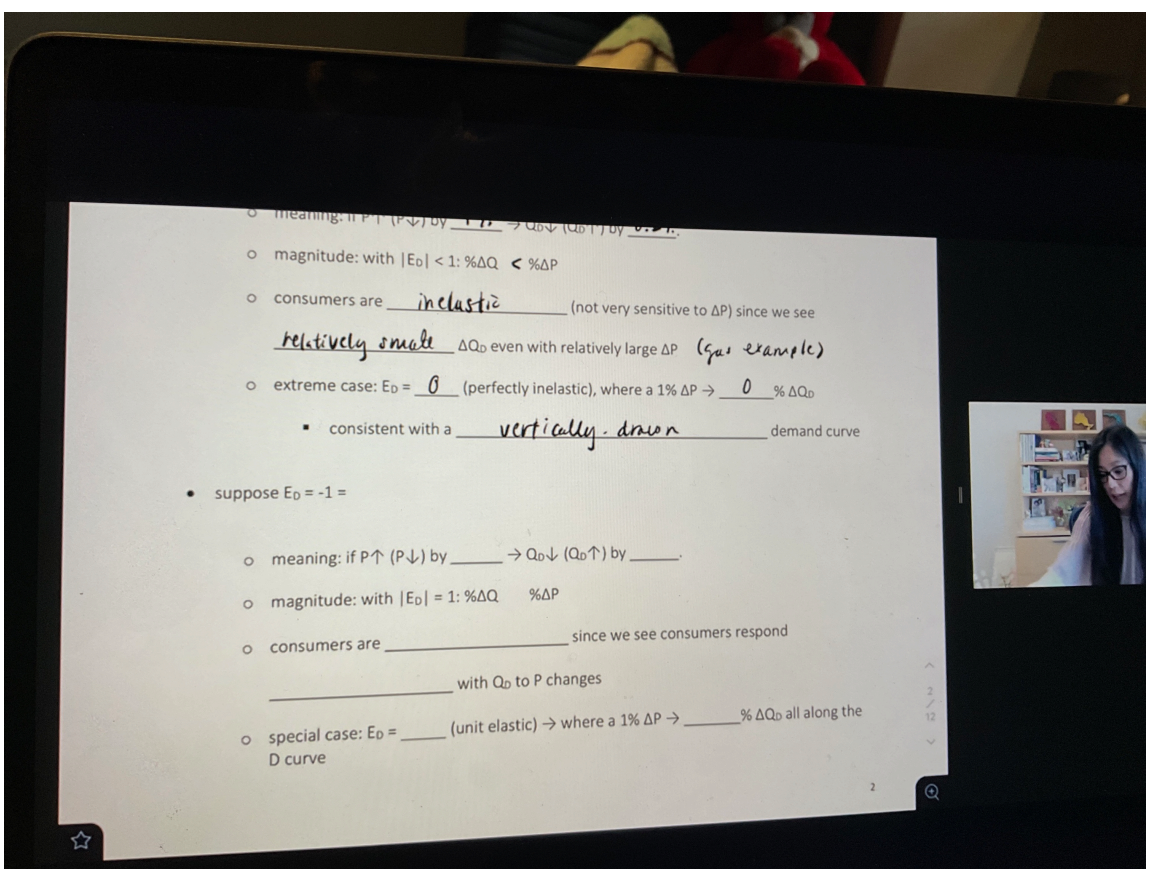
$E_D = \frac{1}{\text{slope}} \times \frac{P}{Q}$

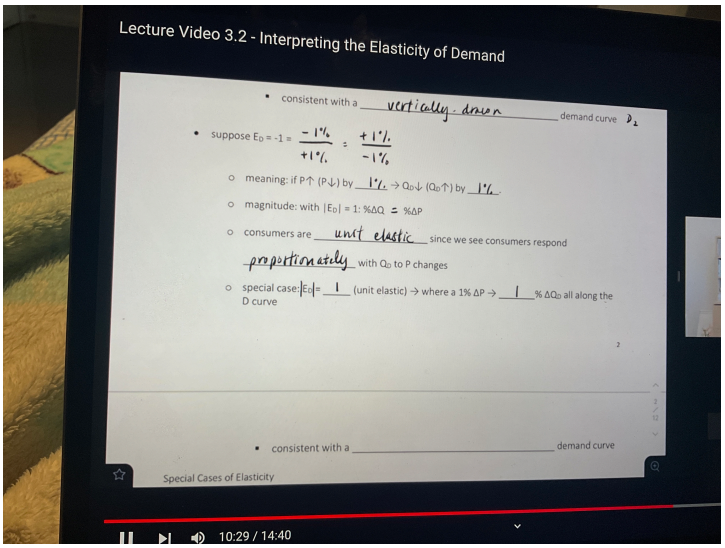
E_D is always negative.

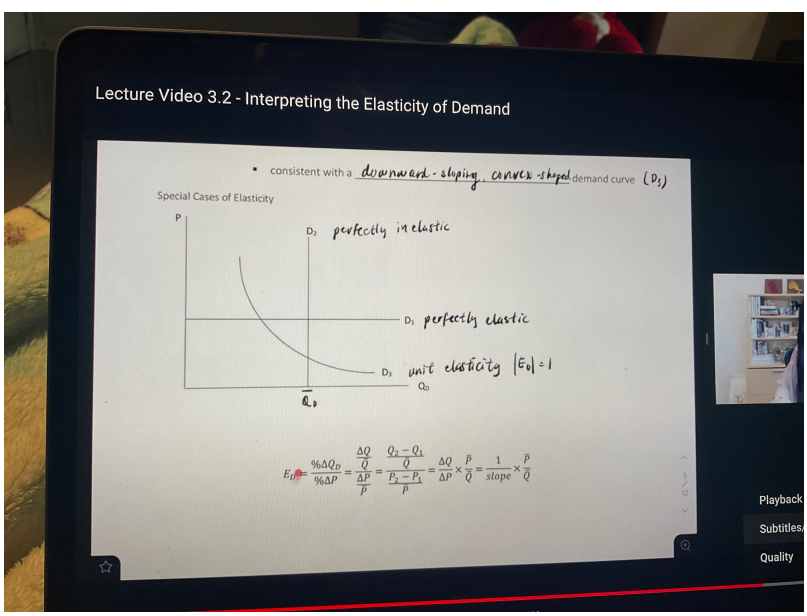
(it's discussed in absolute values)




Lecture Video 3.2 - Interpreting the Elasticity of Demand
suppose E_D = -0.2 = $\frac{-0.2\%}{+1\%} = \frac{+0.2\%}{-1\%}$
meaning: if P↑ (P↓) by 1% → Q_D↓ (Q_D↑) by 0.2%
magnitude: with $|E_D| < 1$: %ΔQ < %ΔP
consumers are inelastic (not very sensitive to ΔP) since we see relatively small ΔQ$_D$ even with relatively large ΔP (gas example)
extreme case: E_D = 0 (perfectly inelastic), where a 1% ΔP → 0 % ΔQ$_D$
consistent with a _____ demand curve
suppose E_D = -1 =
meaning: if P↑ (P↓) by _____ → Q_D↓ (Q_D↑) by _____.
magnitude: with $|E_D| = 1$: %ΔQ %ΔP
consumers are _____ since we see consumers respond _____ with Q_D to P changes
% ΔQ$_D$ all along the


magnitude: with $|E_D| < 1$: %ΔQ < %ΔP
consumers are inelastic (not very sensitive to ΔP) since we see relatively small ΔQ$_D$ even with relatively large ΔP (gas example)
extreme case: E_D = 0 (perfectly inelastic), where a 1% ΔP → 0 % ΔQ$_D$
consistent with a vertically-driven demand curve
suppose E_D = -1 =
meaning: if P↑ (P↓) by _____ → Q_D↓ (Q_D↑) by _____.
magnitude: with $|E_D| = 1$: %ΔQ %ΔP
consumers are _____ since we see consumers respond _____ with Q_D to P changes
special case: E_D = _____ (unit elastic) → where a 1% ΔP → _____ % ΔQ$_D$ all along the D curve


Lecture Video 3.2 - Interpreting the Elasticity of Demand
consistent with a vertically-drawn demand curve D_2
suppose $E_D = -1 = \frac{-1\%}{+1\%} = \frac{+1\%}{-1\%}$
meaning: if P↑ (P↓) by 1% → Q_D↓ (Q_D↑) by 1%
magnitude: with $|E_D| = 1$: $\%\Delta Q = \%\Delta P$
consumers are unit elastic since we see consumers respond proportionately with Q_D to P changes
special case: $|E_D| =$ 1 (unit elastic) → where a 1% ΔP → 1 % ΔQ_D all along the D curve
consistent with a _____ demand curve
Special Cases of Elasticity
10:29 / 14:40


Lecture Video 3.2 - Interpreting the Elasticity of Demand
consistent with a downward-sloping, convex-shaped demand curve (D_3)
Special Cases of Elasticity
P
D_2 perfectly inelastic
D_1 perfectly elastic
D_3 unit elasticity $|E_D| = 1$
Q_D
$E_D = \frac{\%\Delta Q_D}{\%\Delta P} = \frac{\frac{\Delta Q}{\bar{Q}}}{\frac{\Delta P}{\bar{P}}} = \frac{\frac{Q_2 - Q_1}{\bar{Q}}}{\frac{P_2 - P_1}{\bar{P}}} = \frac{\Delta Q}{\Delta P} \times \frac{\bar{P}}{\bar{Q}} = \frac{1}{slope} \times \frac{\bar{P}}{\bar{Q}}$
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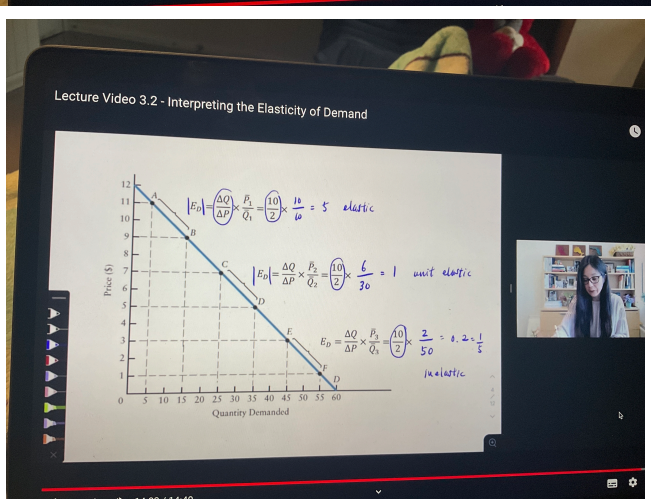
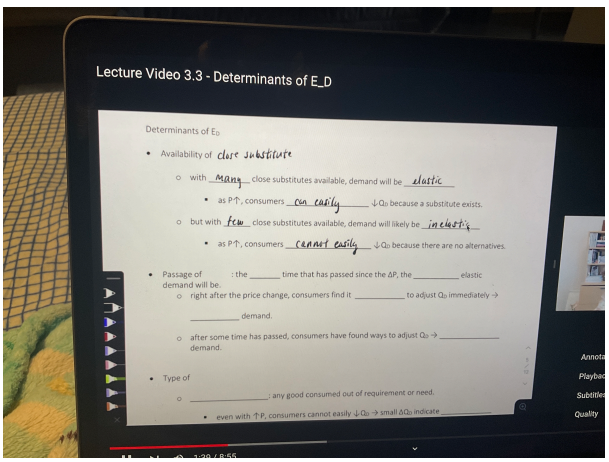

Lecture Video 3.2 - Interpreting the Elasticity of Demand
$|E_D| = \frac{\Delta Q}{\Delta P} \times \frac{\bar{P}_1}{\bar{Q}_1} = \frac{10}{2} \times \frac{10}{10} = 5$ elastic
$|E_D| = \frac{\Delta Q}{\Delta P} \times \frac{\bar{P}_2}{\bar{Q}_2} = \frac{10}{2} \times \frac{6}{30} = 1$ unit elastic
$E_D = \frac{\Delta Q}{\Delta P} \times \frac{\bar{P}_3}{\bar{Q}_3} = \frac{10}{2} \times \frac{2}{50} = 0.2 = \frac{1}{5}$
inelastic
Price ($)
Quantity Demanded
A
B
C
D
E
F
G


Lecture Video 3.3 - Determinants of E_D
Determinants of E_D
• Availability of close substitute
○ with many close substitutes available, demand will be elastic
▪ as P↑, consumers can easily ↓Q_D because a substitute exists.
○ but with few close substitutes available, demand will likely be inelastic
▪ as P↑, consumers cannot easily ↓Q_D because there are no alternatives.
• Passage of : the _____ time that has passed since the ΔP, the _____ elastic demand will be.
○ right after the price change, consumers find it _____ to adjust Q_D immediately → _____ demand.
○ after some time has passed, consumers have found ways to adjust Q_D → _____ demand.
• Type of
○ _____: any good consumed out of requirement or need.
▪ even with ↑P, consumers cannot easily ↓Q_D → small ΔQ_D indicate _____
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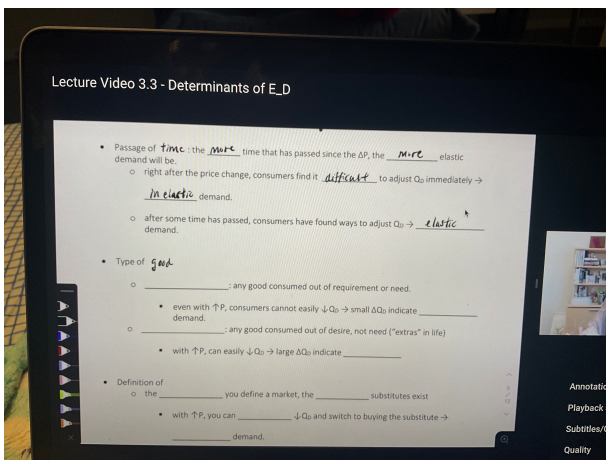
Lecture Video 3.3 - Determinants of E_D
• Passage of time : the more time that has passed since the ΔP, the more elastic demand will be.
○ right after the price change, consumers find it difficult to adjust Q_D immediately → inelastic demand.
○ after some time has passed, consumers have found ways to adjust Q_D → elastic demand.
• Type of good
○ _____: any good consumed out of requirement or need.
▪ even with ↑P, consumers cannot easily ↓Q_D → small ΔQ_D indicate _____ demand.
○ _____: any good consumed out of desire, not need ("extras" in life)
▪ with ↑P, can easily ↓Q_D → large ΔQ_D indicate _____
• Definition of
○ the _____ you define a market, the _____ substitutes exist
▪ with ↑P, you can _____ ↓Q_D and switch to buying the substitute → _____ demand.
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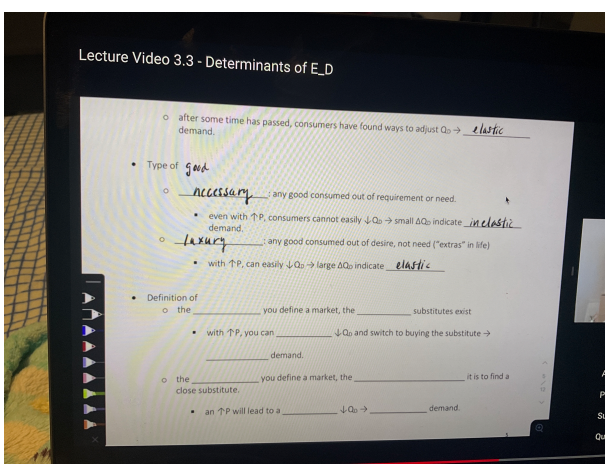
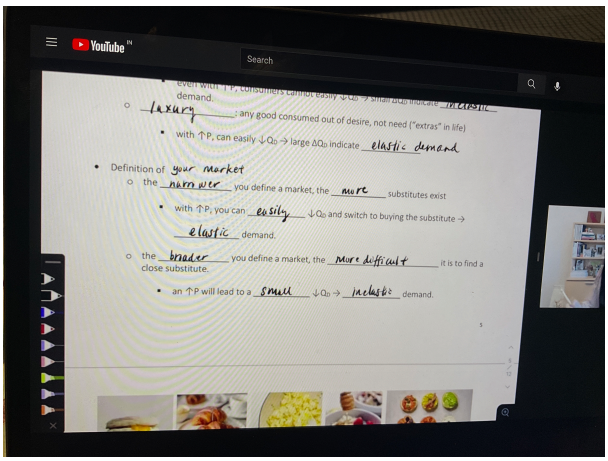

Lecture Video 3.3 - Determinants of E_D
○ after some time has passed, consumers have found ways to adjust Q_D → elastic demand.
• Type of good
○ necessary: any good consumed out of requirement or need.
▪ even with ↑P, consumers cannot easily ↓Q_D → small ΔQ_D indicate inelastic demand.
○ luxury: any good consumed out of desire, not need ("extras" in life)
▪ with ↑P, can easily ↓Q_D → large ΔQ_D indicate elastic
• Definition of
○ the _____ you define a market, the _____ substitutes exist
▪ with ↑P, you can _____ ↓Q_D and switch to buying the substitute → _____ demand.
○ the _____ you define a market, the _____ it is to find a close substitute.
▪ an ↑P will lead to a _____ ↓Q_D → _____ demand.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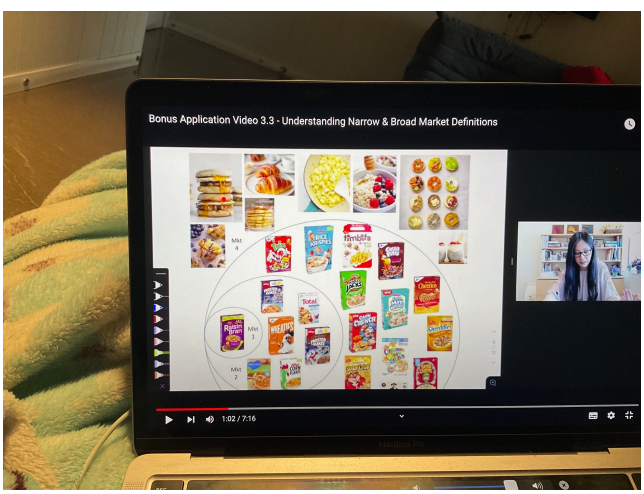
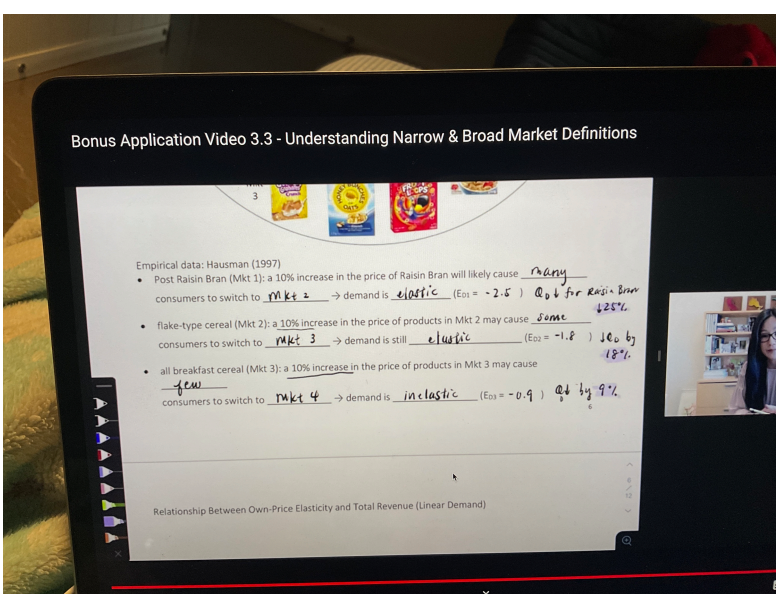
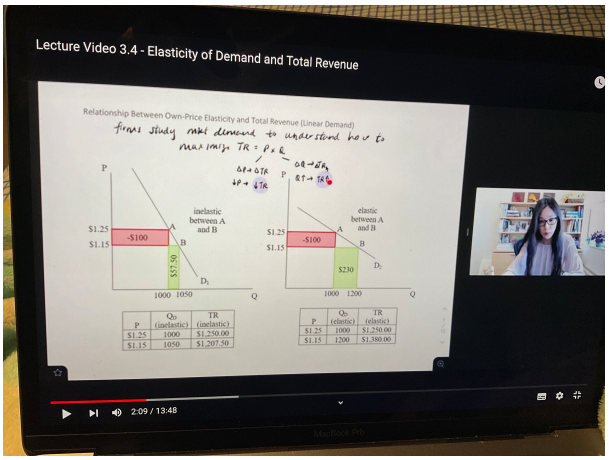
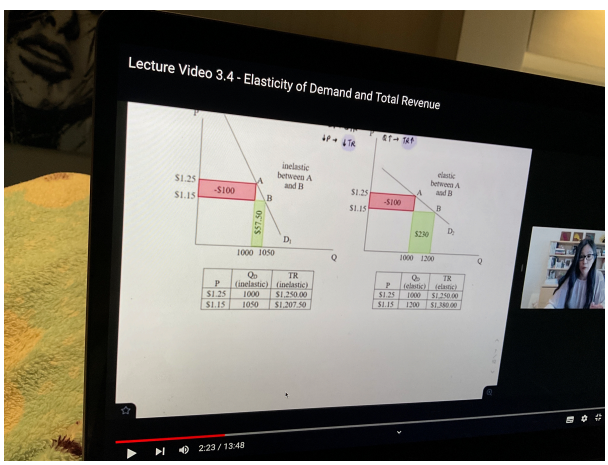
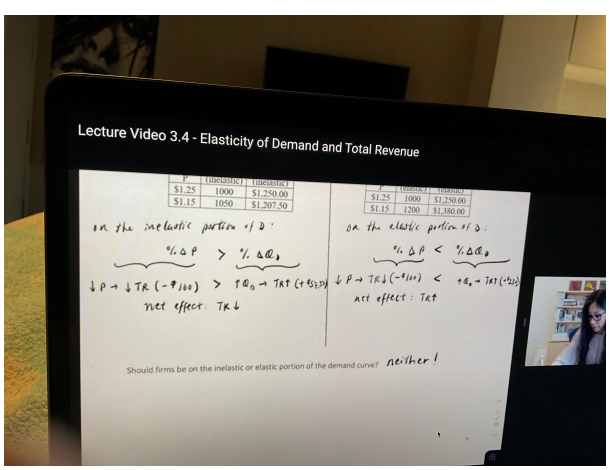
demand.
luxury : any good consumed out of desire, not need ("extras" in life)
with ↑P, can easily ↓Q_D → large ΔQ_D indicate elastic demand
Definition of your market
the narrower you define a market, the more substitutes exist
with ↑P, you can easily ↓Q_D and switch to buying the substitute → elastic demand.
the broader you define a market, the more difficult it is to find a close substitute.
an ↑P will lead to a small ↓Q_D → inelastic demand.

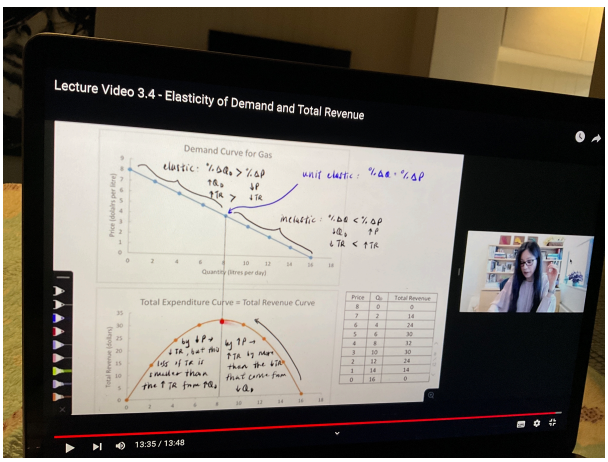

Bonus Application Video 3.3 - Understanding Narrow & Broad Market Definitions
1:02 / 7:16

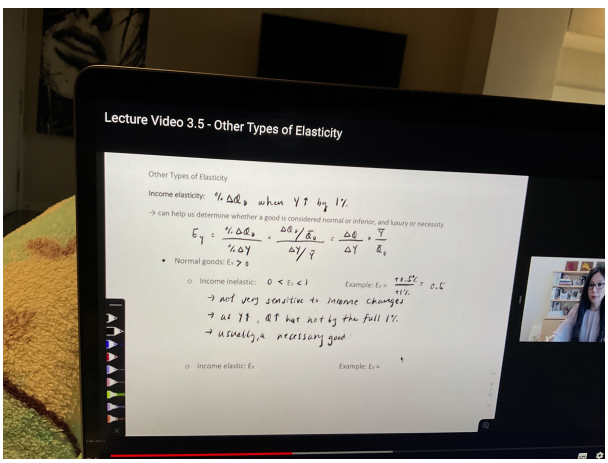

Bonus Application Video 3.3 - Understanding Narrow & Broad Market Definitions
Empirical data: Hausman (1997)
Post Raisin Bran (Mkt 1): a 10% increase in the price of Raisin Bran will likely cause many consumers to switch to Mkt 2 → demand is elastic (E_{D1} = -2.5) Q_D for Raisin Bran ↓25%
flake-type cereal (Mkt 2): a 10% increase in the price of products in Mkt 2 may cause some consumers to switch to Mkt 3 → demand is still elastic (E_{D2} = -1.8) Q_D by 18%
all breakfast cereal (Mkt 3): a 10% increase in the price of products in Mkt 3 may cause few consumers to switch to Mkt 4 → demand is inelastic (E_{D3} = -0.9) Q_D by 9%
Relationship Between Own-Price Elasticity and Total Revenue (Linear Demand)

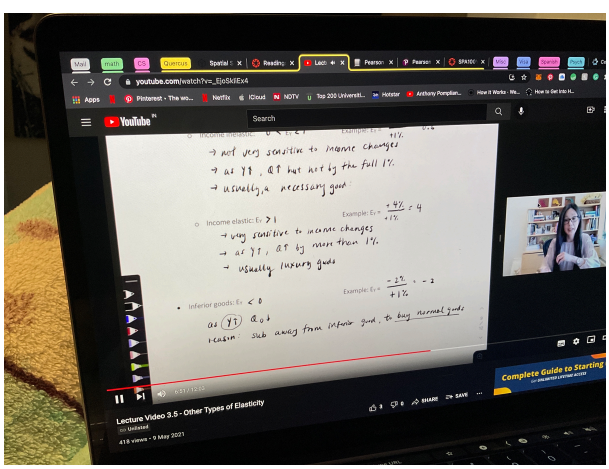

Lecture Video 3.4 - Elasticity of Demand and Total Revenue
Relationship Between Own-Price Elasticity and Total Revenue (Linear Demand)
firms study mkt demand to understand how to maximize TR = P x Q
inelastic between A and B
elastic between A and B
$1.25
$1.15
-$100
$57.50
$230
1000 1050
1000 1200
Q
D1
D2
P | Q1 (inelastic) | TR (inelastic)
$1.25 | 1000 | $1,250.00
$1.15 | 1050 | $1,207.50
P | Q2 (elastic) | TR (elastic)
$1.25 | 1000 | $1,250.00
$1.15 | 1200 | $1,380.00
2:09 / 13:48


Lecture Video 3.4 - Elasticity of Demand and Total Revenue
inelastic between A and B
elastic between A and B
$1.25
$1.15
-$100
$57.50
$230
1000 1050
1000 1200
Q
D1
D2
P | Q1 (inelastic) | TR (inelastic)
$1.25 | 1000 | $1,250.00
$1.15 | 1050 | $1,207.50
P | Q2 (elastic) | TR (elastic)
$1.25 | 1000 | $1,250.00
$1.15 | 1200 | $1,380.00
2:23 / 13:48


Lecture Video 3.4 - Elasticity of Demand and Total Revenue
$1.25 | 1000 | $1,250.00
$1.15 | 1050 | $1,207.50
on the inelastic portion of D:
% Δ P > % Δ Q
↓P → ↓TR (-$100) > ↑Q → TR↑ (+$57.50)
net effect: TR↓
$1.25 | 1000 | $1,250.00
$1.15 | 1200 | $1,380.00
on the elastic portion of D:
% Δ P < % Δ Q
↓P → TR↓ (-$100) < +Q → TR↑ (+$230)
net effect: TR↑
Should firms be on the inelastic or elastic portion of the demand curve? neither!


Lecture Video 3.4 - Elasticity of Demand and Total Revenue
Demand Curve for Gas
elastic: % ΔQd > % ΔP
↑Qd ↓P
↑TR ↓TR
unit elastic: % ΔQd = % ΔP
inelastic: % ΔQd < % ΔP
↓Qd ↑P
↓TR < ↑TR
Total Expenditure Curve = Total Revenue Curve
Price
Qd
Total Revenue
8 0 0
7 2 14
6 4 24
5 6 30
4 8 32
3 10 30
2 12 24
1 14 14
0 16 0
13:35 / 13:48


Lecture Video 3.5 - Other Types of Elasticity
Other Types of Elasticity
Income elasticity: % ΔQd when Y ↑ by 1%
→ can help us determine whether a good is considered normal or inferior, and luxury or necessity
Normal goods: Ey > 0
Income inelastic: 0 < Ey < 1
→ not very sensitive to income changes
→ as Y↑, Q↑ but not by the full 1%
→ usually, a necessary good
Income elastic: Ey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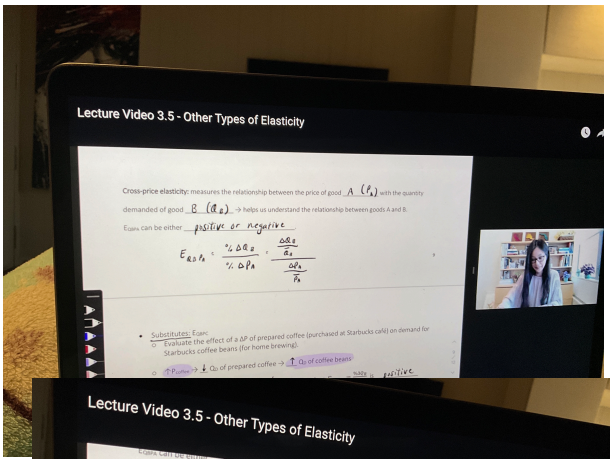
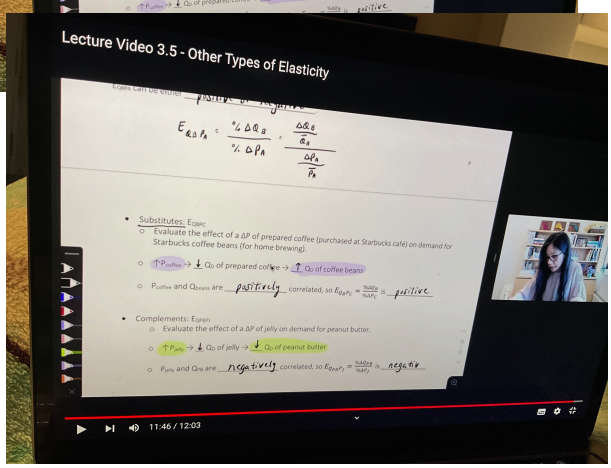
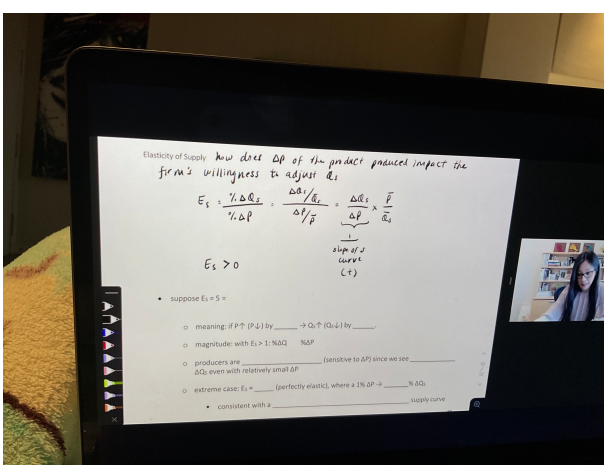
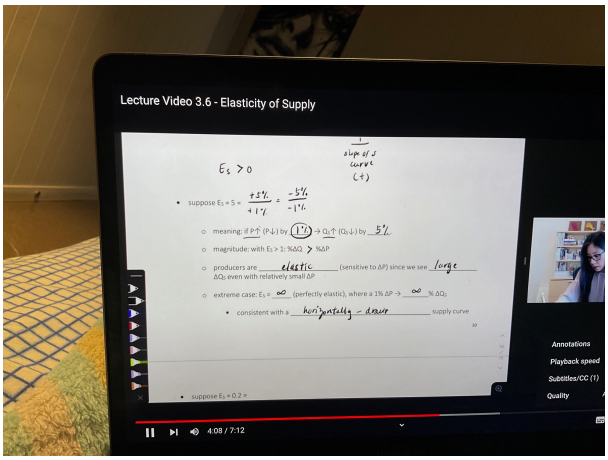
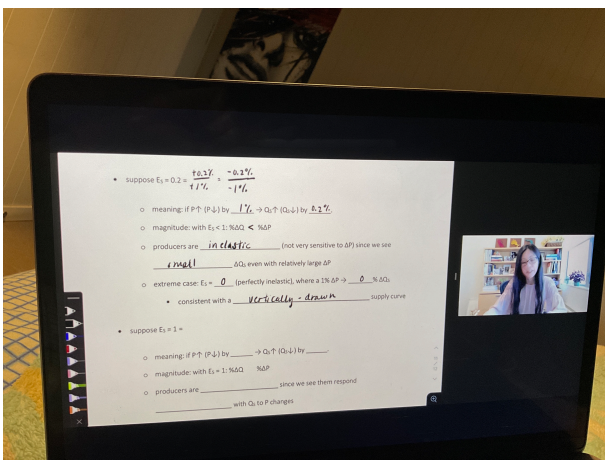
→ not very sensitive to income changes
→ as Y↑, Q↑ but not by the full 1%
→ usually, a necessary good
Income elastic: Ey > 1
→ very sensitive to income changes
→ as Y↑, Q↑ by more than 1%
→ usually luxury goods
Inferior goods: Ey < 0
as Y↑ Q↓
reason: shift away from inferior good, to buy normal goods
Lecture Video 3.5 - Other Types of Elasticity
Complete Guide to Starting

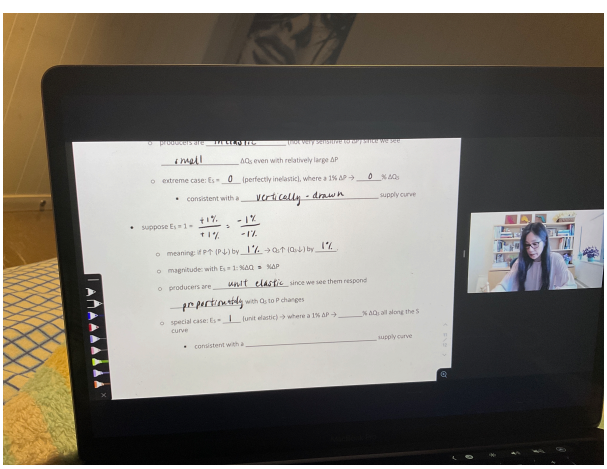

Lecture Video 3.5 - Other Types of Elasticity
Cross-price elasticity: measures the relationship between the price of good A (P_A) with the quantity demanded of good B (Q_B) → helps us understand the relationship between goods A and B.
E_{QBPA} can be either positive or negative
$E_{Q_B P_A} = \frac{\% \Delta Q_B}{\% \Delta P_A} = \frac{\frac{\Delta Q_B}{Q_B}}{\frac{\Delta P_A}{P_A}}$
Substitutes: E_{QBPC}
Evaluate the effect of a ΔP of prepared coffee (purchased at Starbucks café) on demand for Starbucks coffee beans (for home brewing).
↑ P_{coffee} → ↓ Q_D of prepared coffee → ↑ Q_D of coffee beans
positive

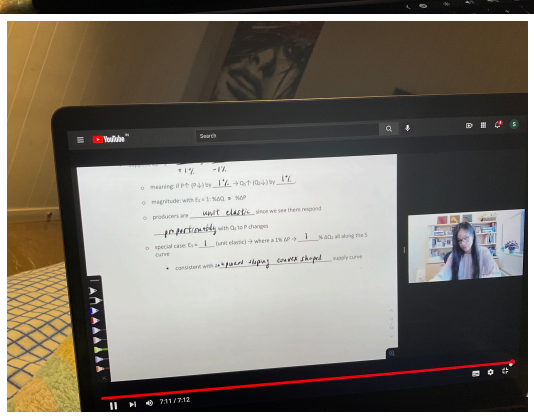

Lecture Video 3.5 - Other Types of Elasticity
$E_{Q_B P_A} = \frac{\% \Delta Q_B}{\% \Delta P_A} = \frac{\frac{\Delta Q_B}{Q_B}}{\frac{\Delta P_A}{P_A}}$
Substitutes: E_{QBPC}
Evaluate the effect of a ΔP of prepared coffee (purchased at Starbucks café) on demand for Starbucks coffee beans (for home brewing).
↑ P_{coffee} → ↓ Q_D of prepared coffee → ↑ Q_D of coffee beans
P_{coffee} and Q_{beans} are positively correlated, so $E_{Q_B P_C} = \frac{\%\Delta Q_B}{\%\Delta P_C}$ is positive
Complements: E_{QBPJ}
Evaluate the effect of a ΔP of jelly on demand for peanut butter.
↑ P_{jelly} → ↓ Q_D of jelly → ↓ Q_D of peanut butter
P_{jelly} and Q_{PB} are negatively correlated, so $E_{Q_{PB} P_J} = \frac{\%\Delta Q_{PB}}{\%\Delta P_J}$ is negative
11:46 / 12:03

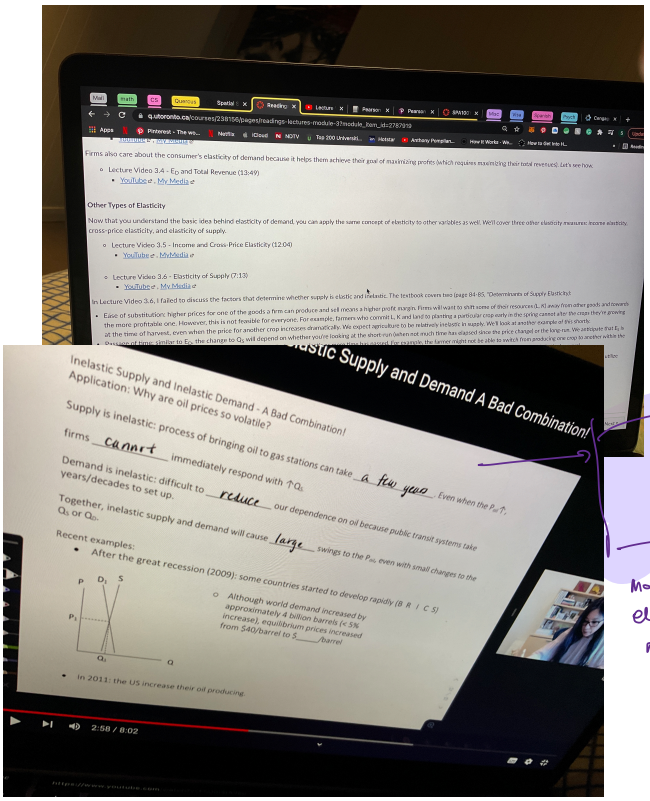

Elasticity of Supply: how does ΔP of the product produced impact the firm's willingness to adjust Q_S
$E_S = \frac{\% \Delta Q_S}{\% \Delta P} = \frac{\Delta Q_S / Q_S}{\Delta P / P} = \frac{\Delta Q_S}{\Delta P} \times \frac{P}{Q_S}$
$\frac{\Delta Q_S}{\Delta P}$ = slope of S curve (↑)
$E_S > 0$
suppose $E_S = 5$ =
meaning: if P↑ (P↓) by _____ → Q_S↑ (Q_S↓) by _____.
magnitude: with $E_S > 1$: %ΔQ %ΔP
producers are _____ (sensitive to ΔP) since we see _____ ΔQ even with relatively small ΔP
extreme case: E_S = _____ (perfectly elastic), where a 1% ΔP → _____% ΔQ_S
consistent with a _____ supply curve


Lecture Video 3.6 - Elasticity of Supply
$E_s > 0$
slope of S curve (+)
suppose $E_s = 5 =$ $\frac{+5\%}{+1\%} = \frac{-5\%}{-1\%}$
meaning: if P↑ (P↓) by 1% → Q_s↑ (Q_s↓) by 5%
magnitude: with $E_s > 1$: %ΔQ > %ΔP
producers are elastic (sensitive to ΔP) since we see large ΔQ$_S$ even with relatively small ΔP
extreme case: E_s = ∞ (perfectly elastic), where a 1% ΔP → ∞ % ΔQ$_S$
consistent with a horizontally - drawn supply curve
suppose E_s = 0.2 =
Annotations
Playback speed
Subtitles/CC (1)
Quality
4:08 / 7:12

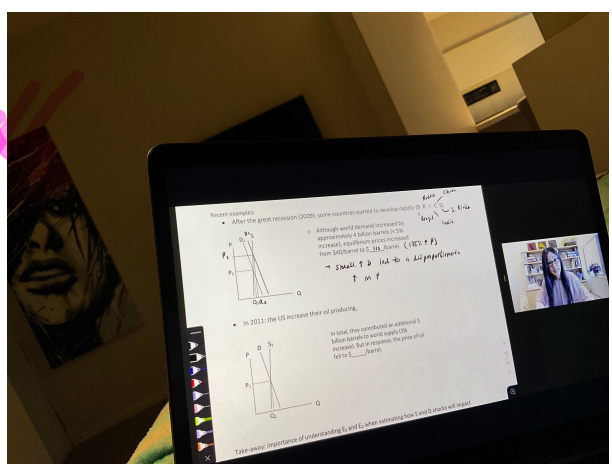

suppose $E_s = 0.2 = \frac{+0.2\%}{+1\%} = \frac{-0.2\%}{-1\%}$
meaning: if P↑ (P↓) by 1% → Q_s↑ (Q_s↓) by 0.2%
magnitude: with E_s < 1: %ΔQ < %ΔP
producers are inelastic (not very sensitive to ΔP) since we see small ΔQ$_S$ even with relatively large ΔP
extreme case: E_s = 0 (perfectly inelastic), where a 1% ΔP → 0 % ΔQ$_S$
consistent with a vertically - drawn supply curve
suppose E_s = 1 =
meaning: if P↑ (P↓) by ____ → Q_s↑ (Q_s↓) by ____
magnitude: with E_s = 1: %ΔQ ____ %ΔP
producers are ____ since we see them respond ____ with Q_s to P changes

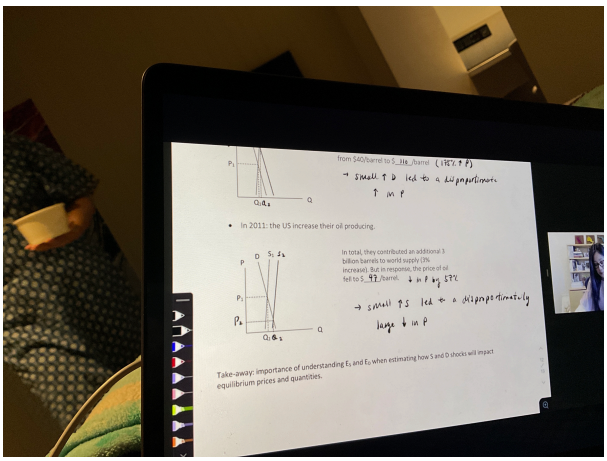

small ΔQ$_S$ even with relatively large ΔP
extreme case: E_s = 0 (perfectly inelastic), where a 1% ΔP → 0 % ΔQ$_S$
consistent with a vertically - drawn supply curve
suppose E_s = 1 = $\frac{+1\%}{+1\%} = \frac{-1\%}{-1\%}$
meaning: if P↑ (P↓) by 1% → Q_s↑ (Q_s↓) by 1%
magnitude: with E_s = 1: %ΔQ = %ΔP
producers are unit elastic since we see them respond
proportionately with Q_s to P changes
special case: E_s = 1 (unit elastic) → where a 1% ΔP → ____ % ΔQ$_S$ all along the S curve
consistent with a ____ supply curve

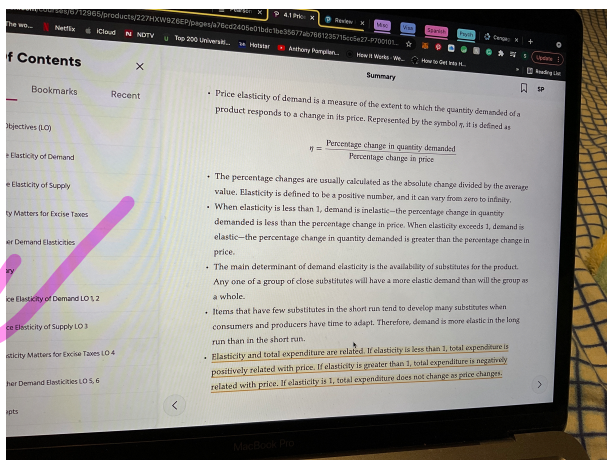

YouTube
Search
meaning: if P↑ (P↓) by 1% → Q_s↑ (Q_s↓) by 1%
magnitude: with E_s = 1: %ΔQ = %ΔP
producers are unit elastic since we see them respond
proportionately with Q_s to P changes
special case: E_s = 1 (unit elastic) → where a 1% ΔP → 1 % ΔQ$_S$ all along the S curve
consistent with a upward sloping curve shaped supply curve
7:11 / 7:12



More elastic → flatter & steeper




from $40/barrel to $ 116 /barrel (↑ 77% ↑)
→ small ↑ D led to a ↑↑ proportionate ↑ in P
• In 2011: the US increase their oil producing.
In total, they contributed an additional 3 billion barrels to world supply (3% increase). But in response, the price of oil fell to $ 97 /barrel. ↓ in P by 17%
→ small ↑ S led to a disproportionately large ↓ in P
Take-away: importance of understanding Ed and Es when estimating how S and D shocks will impact equilibrium prices and quantities.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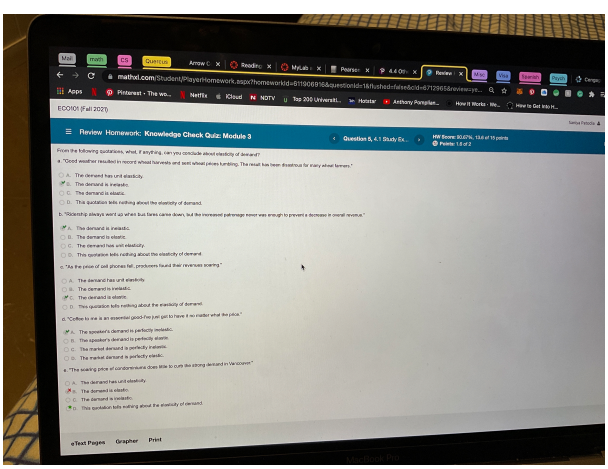
Summary
Price elasticity of demand is a measure of the extent to which the quantity demanded of a product responds to a change in its price. Represented by the symbol η, it is defined as
$$\eta = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price}}$$
The percentage changes are usually calculated as the absolute change divided by the average value. Elasticity is defined to be a positive number, and it can vary from zero to infinity.
When elasticity is less than 1, demand is inelastic—the percentage change in quantity demanded is less than the percentage change in price. When elasticity exceeds 1, demand is elastic—the percentage change in quantity demanded is greater than the percentage change in price.
The main determinant of demand elasticity is the availability of substitutes for the product. Any one of a group of close substitutes will have a more elastic demand than will the group as a whole.
Items that have few substitutes in the short run tend to develop many substitutes when consumers and producers have time to adapt. Therefore, demand is more elastic in the long run than in the short run.
Elasticity and total expenditure are related. If elasticity is less than 1, total expenditure is positively related with price. If elasticity is greater than 1, total expenditure is negatively related with price. If elasticity is 1, total expenditure does not change as price changes.


mathxl.com/Student/PlayerHomework.aspx?homeworkId=619096...
ECO101 (Fall 2021)
Review Homework: Knowledge Check Quiz: Module 3
Question 5, 4.1 Study Ex...
HW Score: 80.07%, 13.6 of 15 points
Points: 1.6 of 2
From the following quotations, what, if anything, can you conclude about elasticity of demand?
a. "Good weather resulted in record wheat harvests and sent wheat prices tumbling. The result has been disastrous for many wheat farmers."
A. The demand has unit elasticity.
B. The demand is inelastic.
C. The demand is elastic.
D. This quotation tells nothing about the elasticity of demand.
b. "Ridership always went up when bus fares came down, but the increased patronage never was enough to prevent a decrease in overall revenue."
A. The demand is inelastic.
B. The demand is elastic.
C. The demand has unit elasticity.
D. This quotation tells nothing about the elasticity of demand.
c. "As the price of cell phones fell, producers found their revenues soaring."
A. The demand has unit elasticity.
B. The demand is inelastic.
C. The demand is elastic.
D. This quotation tells nothing about the elasticity of demand.
d. "Coffee to me is an essential good—I've just got to have it no matter what the price."
A. The speaker's demand is perfectly inelastic.
B. The speaker's demand is perfectly elastic.
C. The market demand is perfectly inelastic.
D. The market demand is perfectly elastic.
e. "The soaring price of condominiums does little to curb the strong demand in Vancouver."
A. The demand has unit elasticity.
B. The demand is elastic.
C. The demand is inelastic.
D. This quotation tells nothing about the elasticity of demand.
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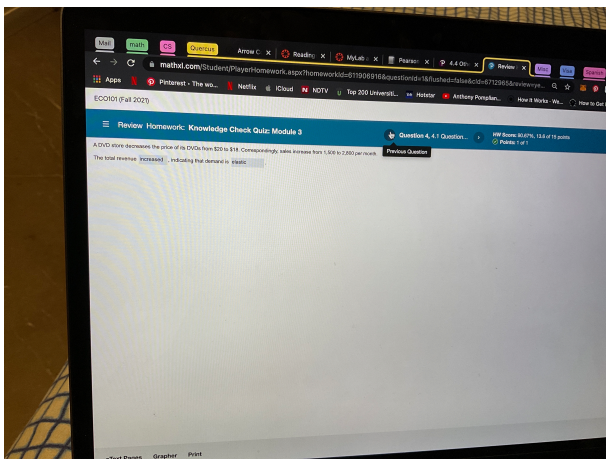

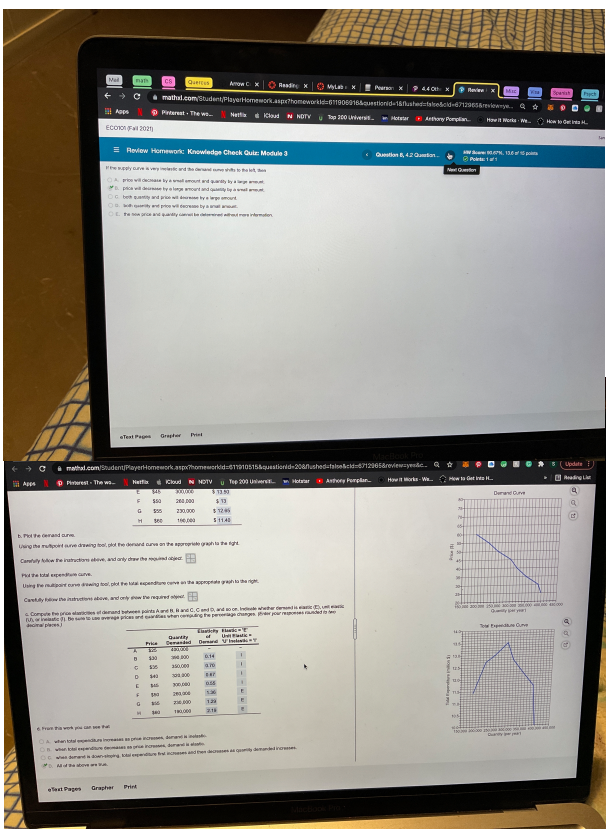

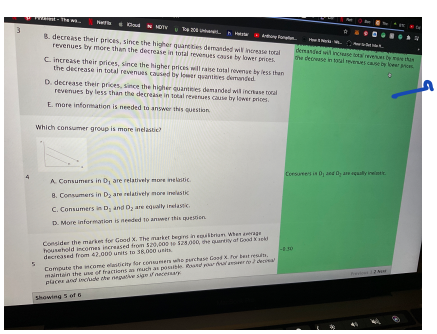

slope is same