An elasticity is simply a measure of how responsive something is to changes in something else.

A demand elasticity is a measure of how responsive the demand for some good is to changes in one of the \_

A supply elasticity is a measure of how responsive the supply of some good is to changes in one of the \_

- The own-price elasticity of demand is a measure of how responsive the demand for a good is to change in its \_

- The own-price elasticity of supply is a measure of how responsive the supply of a good is to change in its \_
Formulas for Calculating the Own-Price Elasticity

Own-price elasticity of demand:

\[ E_D = \frac{\text{Percentage Change in Quantity Demanded}}{\text{Percentage Change in Price}} \]

\[ = \frac{\% \Delta Q_D}{\% \Delta P} \]

\[ = \frac{\hat{Q}_D}{\hat{P}} \]

REMEMBER: \( E_D \) is normally a negative number.
Formulas for Calculating the Own-Price Elasticity

Own-price elasticity of supply:

\[ E_S = \frac{\text{Percentage Change in Quantity Supplied}}{\text{Percentage Change in Price}} \]

\[ = \frac{\% \Delta Q_S}{\% \Delta P} \]

\[ = \frac{\hat{Q}_S}{\hat{P}} \]

REMEMBER: \( E_S \) is normally a positive number.
How Responsive is Quantity to Price?

Range of Price Elasticities of DEMAND

**PERFECTLY ELASTIC**
\[ |E_D| = \infty \]
\[ \hat{Q}_D = \text{any % change} \]
\[ \hat{P} = 0 \]

**ELASTIC**
\[ 1 < |E_D| < \infty \]
\[ |\hat{Q}_D| > |\hat{P}| \]

**UNIT ELASTIC**
\[ |E_D| = 1 \]
\[ |\hat{Q}_D| = |\hat{P}| \]

**INELASTIC**
\[ 0 < |E_D| < 1 \]
\[ |\hat{Q}_D| < |\hat{P}| \]

**PERFECTLY INELASTIC**
\[ |E_D| = 0 \]
\[ \hat{Q}_D = 0 \]
\[ \hat{P} = \text{any % change} \]
How Responsive is Quantity to Price?

Range of Price Elasticities of SUPPLY

**PERFECTLY ELASTIC**

\[ E_S = \infty \]

\[ \hat{Q}_S = \text{any } \% \text{ change} \]

\[ \hat{P} = 0 \]

**ELASTIC**

\[ 1 < E_S < \infty \]

\[ \hat{Q}_S > \hat{P} \]

**UNIT ELASTIC**

\[ E_S = 1 \]

\[ \hat{Q}_S = \hat{P} \]

**INELASTIC**

\[ 0 < E_S < 1 \]

\[ \hat{Q}_S < \hat{P} \]

**PERFECTLY INELASTIC**

\[ E_S = 0 \]

\[ \hat{Q}_S = 0 \]

\[ \hat{P} = \text{any } \% \text{ change} \]
Elasticity Examples

1. If a 40% increase in quantity demanded resulted from a 20% decrease in its price, what is the own-price elasticity of demand?

\[ E_D = \frac{\text{Percentage Change in Quantity Demanded}}{\text{Percentage Change in Price}} \]

\[ = \frac{\overset{\wedge}{Q_D}}{\overset{\wedge}{P}} \]

\[ \overset{\wedge}{Q_D} = \]

\[ \overset{\wedge}{P} = \]

\[ \frac{\overset{\wedge}{Q_D}}{\overset{\wedge}{P}} = (\text{What is the degree of elasticity?}) \]
2. If the price increases by 40% and the price elasticity of demand is \(-1.5\), what would be the resulting percent change in quantity demanded?

\[
E_D = \frac{\text{Percentage Change in Quantity Demanded}}{\text{Percentage Change in Price}} = \frac{\hat{Q}_D}{\hat{P}} = \\
\hat{Q}_D = \\
\hat{P} = \\
\hat{Q}_D = = (\text{Quantity demanded } \text{__________________________})
\]
3. If the quantity supplied decreases by 20% and the price elasticity of supply is 0.8, what would be the resulting percent change in price?

\[ E_s = \frac{\text{Percentage Change in Quantity Supplied}}{\text{Percentage Change in Price}} \]

\[ = \frac{\triangle Q_s}{\triangle P} = \]

\[ \triangle Q_s = \]

\[ \triangle P = \]

\[ = = (\text{Price } \underline{\text{__________________________________}}) \]
4. If the quantity of lamb demanded increases from 20 million lbs to 22 million lbs and the price of lamb was originally $7.00/lb, what is the new price of lamb assuming that the price elasticity of the lamb demand is -0.2?

\[
E_D = \frac{\text{Percentage Change in Quantity Demanded}}{\text{Percentage Change in Price}} = \frac{\hat{Q_D}}{\hat{P}}
\]

Since price decreases by _________ and the old price was $7.00/lb, the new price is ____________________less so the new price is ______________.
5. Assume that the equilibrium price of rice is $12.00/cwt, the equilibrium quantity is 40 million cwt, the elasticity of rice demand is -0.6, and the elasticity of rice supply is 0.8. If bad weather shifts the supply of rice to the left so that the equilibrium price increases to $18.00/cwt, what is the new equilibrium quantity demanded of rice? quantity supplied of rice?

\[
\frac{\text{Percentage Change in Quantity Demanded}}{\text{Percentage Change in Price}} = \frac{\hat{Q}_D}{\hat{P}} = \frac{\hat{P}}{\hat{Q}_D} = \frac{\hat{Q}_D}{\hat{P}}
\]

\[
\hat{P} = \frac{\hat{Q}_D}{\hat{P}} = \frac{\hat{Q}_D}{\hat{P}} = \frac{\hat{Q}_D}{\hat{P}} = \frac{\hat{Q}_D}{\hat{P}}
\]

\[
\hat{Q}_D = \frac{\hat{Q}_D}{\hat{P}} = \frac{\hat{Q}_D}{\hat{P}} = \frac{\hat{Q}_D}{\hat{P}} = \frac{\hat{Q}_D}{\hat{P}}
\]

The question asks for the new quantity level and NOT the percentage change. Since quantity declines by _________ and the old quantity was 40 million cwt, the new equilibrium quantity is _______________ = _______________.

Elasticity Examples (continued)
6. The government has implemented a new policy to support the price of sorghum at $4.06/bu. If the sorghum market equilibrium price is $3.50/bu, the equilibrium quantity of sorghum is 400.0 million bu and the elasticity of supply is 0.4, and the elasticity of demand is -0.8, then what is the new quantity supplied and the new quantity demanded at the support price? How much sorghum would the government need to buy to keep the price supported at $4.06/bu?

\[ \hat{P} = \hat{Q} = \]

\[ \hat{Q} = \hat{Q} = \]

What number is ______ less than 400 million bu?

What number is _____ more than 400 million bu?

How much sorghum does the government need to buy to support price at $4.06/bu?
See If You Can Get the Answers to these Questions
(No extra Credit. Just for you to try.)

1. If the price of nutty bars increases by 40%, the price elasticity of nutty bar demand is -1.2, the equilibrium price is $2.55/bar, and the equilibrium quantity is 12.5 million bars, what will be the new level of nutty bar sales?

   Answer = 6.5 million bars

2. Today nutty bars cost $2.55/bar and 12.5 million bars are sold. Last week the price was $3.40/bar. Given the same nutty bar price elasticity of demand (-1.2) and a nutty bar supply elasticity of 0.4, what was the change in nutty bar sales (quantity demanded) from last week to today?

   Answer = 3.75 million bars
The government has implemented a new policy to support the price of sorghum at $3.95/bu. If the sorghum market equilibrium price is $3.50/bu, the equilibrium quantity of sorghum is 400.0 million bu and the elasticity of supply is 0.6, and the elasticity of demand is -0.5, then what is the new quantity supplied and the new quantity demanded at the support price? How much sorghum would the government need to buy to keep the price supported at $3.95/bu?

Note: This is bonus points for those of you who watched the lecture 8 video to the end and reviewed the lecture material. Put you answers where indicated on Problem Set #1. (Hint: There are actually two questions that you need to answer.)