This handout will begin by first giving a short review of material we covered in lecture dealing with the price elasticity of demand (PED). Then we will take a look at three examples of calculating PED. First will be the question and after that will be a solution to the problems. I would advise you to first try to work out the examples before you check the answers.

1. Review of Price Elasticity of Demand

The definition of Price Elasticity of Demand (PED) is:

\[
\text{Price Elasticity of Demand} = \frac{\text{Percentage Change in Quantity Demanded}}{\text{Percentage Change in Price}} = \frac{\%\Delta Q_D}{\%\Delta P}
\]

In order to calculate the PED we need two points on the demand curve, \((Q_{D_1}, P_1)\) and \((Q_{D_2}, P_2)\).

In order to calculate the PED we use the midpoint formula

\[
\text{PED} = \frac{Q_{D_2} - Q_{D_1}}{Q_{D_1} + Q_{D_2}} \cdot \frac{P_2 - P_1}{P_1 + P_2}
\]

Once we have calculated the PED between two points on the demand curve, we can say if demand between those points is "elastic," "inelastic" or "unit elastic" as follows:

- Demand is "elastic" at a certain point if PED < -1
- Demand is "unit elastic" at a certain point if PED = -1
- Demand is "inelastic" at a certain point if 0 < PED < -1
There are a number of factors that can determine if a demand curve will be more elastic, or more inelastic. We covered this material on Wednesday, February 17th.

Four Factors Affecting PED:

1. Availability of close substitutes
2. Definition of Market
3. Amount of time
4. Necessities vs. luxuries

When calculating different elasticities it is very important to keep in mind, what information you need to calculate a certain elasticity and what information you have available. Also, sometimes there is information that is not relevant to certain elasticities. Be sure you are aware of what information is necessary and what information is not. The following examples emphasize this point. The answers to these example problems are at the end of this handout.

2. Examples of Price Elasticity of Demand

Example #1

You are given market data that says when the price of pizza is $4, the quantity demanded of pizza is 60 slices and the quantity demanded of cheese bread is 100 pieces. When the price of pizza is $2, the quantity demanded of pizza is 80 slices and the quantity demanded of cheese bread is 70 pieces.

- Can the Price-Elasticity of Demand be calculated for either good?
- If so, calculate the PED.

Example #2

Consider the markets for widgets and cogs. You study survey data and observe that if widgets cost $5, then 100 widgets are demanded. You also observe that if widgets cost $3, then 150 cogs are demanded and if widgets cost $4 then 100 cogs are demanded. If cogs cost $2, then 125 cogs are demanded.

- Can the Price-Elasticity of Demand be calculated for either good?
- If so, calculate the PED.

Example #3

Consider the market for widgets and cogs (again). You study survey data and observe that if widgets cost $5, then 100 widgets are demanded and 60 cogs are demanded. You also observe that if widgets cost $3, then 200 widgets are demanded and 100 cogs are demanded. If cogs cost $2, then 125 cogs are demanded.

- Can the Price-Elasticity of Demand be calculated for either good?
- If so, calculate the PED.
Solution to Example #1

Can the Price-Elasticity of Demand be calculated for either good? If so, calculate the PED.

In order to calculate PED we need two (quantity, price) pairs for one good (two points along a certain goods demand curve). We are given this information for pizza. We are never given this information for cheese bread.

We have two (quantity, price) pairs for pizza. Specifically, \((Q_{D_1}, P_1) = (60, $4)\) and \((Q_{D_2}, P_2) = (80, $2)\). Then, plugging these numbers into the above formula, we obtain:

\[
PED = \frac{Q_{D_2} - Q_{D_1}}{Q_{D_1} + Q_{D_2}} = \frac{80 - 60}{60 + 80} = \frac{20}{140} = \frac{2}{7}
\]

Given this data, the PED is \(-\frac{3}{7}\).

**NOTE:** This tells us that given these two points, this demand curve for pizza is inelastic. We know this because the PED is between 0 and -1.

Solution to Example #2

Can the Price-Elasticity of Demand be calculated for either good? If so, calculate the PED.

In order to calculate PED we need two (quantity, price) pairs for one good (two points along a certain goods demand curve). We are not given this information for either widgets or cogs. We cannot calculate PED for either good in this case.
Solution to Example #3

Can the Price-Elasticity of Demand be calculated for either good? If so, calculate the PED.

In order to calculate PED we need two (quantity, price) pairs for one good (two points along a certain goods demand curve). We are given this information for widgets. We are never given this information for cogs.

We have two (quantity, price) pairs for pizza. Specifically, \((Q_{D1}, \ P_1) = (100, \$5)\) and \((Q_{D2}, \ P_2) = (200, \$3)\). Then, plugging these numbers into the above formula, we obtain:

\[
\text{PED} = \frac{Q_{D2} - Q_{D1}}{Q_{D1} + Q_{D2}} = \frac{200 - 100}{100 + 200} = \frac{100}{300} = \frac{100}{150} \times -\frac{4}{2} = \frac{-4}{3}
\]

Given this data, the PED is \(-\frac{4}{3}\).

**NOTE:** This tells us that given these two points, this demand curve for widgets is **elastic**. We know this because the PED is less than -1.