

Principles of Economics and Management I

Ciências ULisboa · MMAEG · 2026/2027

Problem Set 3 · Demand and Elasticity

Session 3 · LN03

Exercise level: **[Easy]** routine / warm-up **[Medium]** typical test level **[Hard]** challenge (above test level, to consolidate mastery)

1. (2 points) **[Easy] Reservation price and consumer surplus.** Five buyers each want at most one unit of a good, with reservation prices of €12, €10, €8, €6 and €4.
 - (a) (1 point) At a price of €7, who buys and what quantity is traded?
 - (b) (1 point) Compute the consumer surplus.
2. (2 points) **[Easy] Point elasticity and elasticity regimes.** Demand for a good is $Q(P) = 200 - 5P$.
 - (a) (1 point) Compute the price elasticity of demand at $P = 20$ and at $P = 30$.
 - (b) (1 point) Classify each point by its elasticity regime.
3. (3 points) **[Medium] Elasticity and revenue.** Continue with $Q(P) = 200 - 5P$.
 - (a) (1 point) Compute total revenue at $P = 20$ and at $P = 30$.
 - (b) (1 point) Starting from $P = 30$, does cutting the price raise or lower revenue? Justify using the elasticity.
4. (3 points) **[Medium] Income elasticity and cross-price elasticity.** When income rises from €1000 to €1100, demand for public transport trips falls from 50 to 48. Separately, when gasoline goes from €1.60 to €1.76 per liter, that same demand rises from 50 to 53. Measure every percentage change from the starting value.
 - (a) (1 point) Compute the income elasticity. Is the good normal or inferior?
 - (b) (1 point) Compute the cross-price elasticity. Are the goods substitutes or complements?
 - (c) (1 point) Interpret the two results together.
5. (5 points) **[Hard] From individual demands to market demand.** Two consumers. Ana's demand is $q_A = 12 - 2p$ and Bruno's is $q_B = 8 - p$, both for prices low enough that the quantity is positive, and zero above that.
 - (a) (1 point) At which price does each consumer leave the market?
 - (b) (2 points) Write market demand $Q(p)$ over the whole range $p \geq 0$, as a piecewise function, and explain the kink.
 - (c) (1 point) At $p = €3$, compute each consumer's surplus and the total.
 - (d) (1 point) Is market demand still linear? Is its elasticity at $p = 3$ the average of the two individual elasticities?
6. (5 points) **[Hard] Constant elasticity demand and the log-log form.** A firm's demand is estimated as $\ln Q = 8 - 1.4 \ln P + 0.9 \ln M + 0.5 \ln P_Y$, where M is income and P_Y the price of a rival product.
 - (a) (1 point) State the three elasticities and classify the good on each of them.

- (b) (1 point) Write the demand in levels, and verify that the price elasticity really is constant.
- (c) (2 points) The firm raises its price by 5%. What happens to quantity and to revenue, roughly?
- (d) (1 point) A recession cuts income by 10% while the rival cuts its price by 4%. What happens to quantity?