

Name:

Student Number:

### Exam #3 (100 Points Total)

- The space provided below each question should be sufficient for your answer. If you need additional space, ask for additional paper.
- You are allowed to use a calculator, but only the basic functions. Use of advanced formulas (e.g., if your calculator does present value) or of material that you have programmed into your calculator is not allowed and will be considered cheating.
- You are encouraged to show your work for partial credit. It is very difficult to give partial credit if the only thing on your page is “ $x = 3$ ”.
- A **Pareto efficient** (or **Pareto optimal**) allocation or outcome is one in which it is not possible find a different allocation or outcome in which nobody is worse off and at least one person is better off. An allocation or outcome B is a **Pareto improvement over A** if nobody is worse off with B than with A and at least one person is better off.
- **Total revenue** is price times quantity:  $TR = pq$ .
- The **price elasticity of demand at point A** measures the percentage change in quantity demanded (relative to the quantity demanded at point A) resulting from a 1% increase in the price (relative to the price at point A). The formula is

$$\varepsilon(A) = \frac{\% \text{ change in } q}{\% \text{ change in } p} = \frac{\frac{\Delta q}{q_A}}{\frac{\Delta p}{p_A}} = \frac{\Delta q}{\Delta p} \cdot \frac{p_A}{q_A} = \frac{q_B - q_A}{p_B - p_A} \cdot \frac{p_A}{q_A}.$$

**In English** If, at point A, a small change in price causes the quantity demanded to increase by a lot, demand at point A is elastic; if quantity demanded only changes by a little then demand at point A is inelastic; and if quantity demanded changes by a proportional amount then demand at point A has unit elasticity.

**In math** If, at point A, the price elasticity of demand is less than  $-1$  (e.g.,  $-2$ ), then demand at point A is elastic; if the elasticity is greater than  $-1$  (e.g.,  $-\frac{1}{2}$ ), then demand at point A is inelastic; if the elasticity is equal to  $-1$  then demand at point A has unit elasticity.