

**5.1 AN ECONOMICS APPLICATION: CONSUMER SURPLUS AND PRODUCER SURPLUS**

Up to this point when we looked at supply and demand curves, we considered the demand and supply curves as functions of the price. Typically, however, in economics, the demand and supply curves are written in terms of the quantity sold.

*Economics 101 (or maybe lower)*

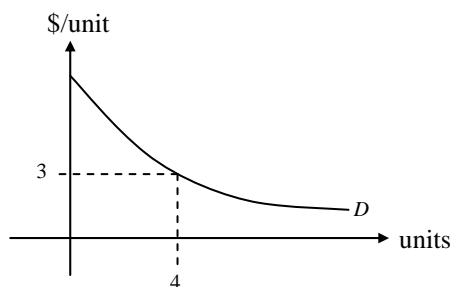
Normally, the demand for an object is higher at lower prices, and the supply of an object increases at higher prices. In a competitive market with elastic pricing, the equilibrium point (or market price) is the intersection of the demand and supply curves.

*Example:* Let  $D(x) = 7 - x$  for  $0 \leq x \leq 7$  be the price, in dollars per unit, that consumers are willing to pay for  $x$  units of an item. Let  $S(x) = 2\sqrt{x+1}$  be the price, in dollars per unit, that producers are willing to accept for  $x$  units. Find the equilibrium point.

*Utility and Consumer Surplus*

**Utility** is defined as the amount of pleasure derived from purchasing  $x$  units of a product. Consider the demand curve below. A Demand Curve gives the price per unit that the consumer is willing to pay for  $x$  units.

*Example:* The area under the demand curve is \_\_\_\_\_.  
This is also known as the total utility.



*Example:* The total utility derived from purchasing 4 units at a price of \$3 is given by \_\_\_\_\_.

*Example:* The total actual price spent is \_\_\_\_\_.

The **consumer surplus** is the benefit (or extra utility) that consumers enjoy from the actual price they paid being less than what they were willing to pay.

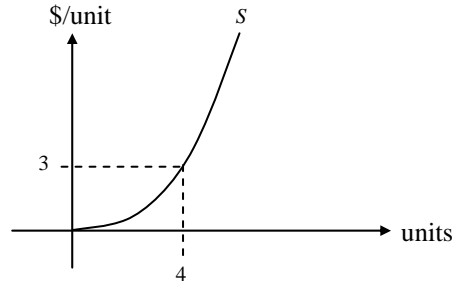
*Example:* Using the graph above, label the geometric interpretation of consumer surplus..

*Example:* The consumer surplus is given by the equation \_\_\_\_\_.

*Producer Surplus*

Consider the supply curve below. A Supply curve gives the price per unit that the seller is willing to accept when supplying  $x$  units.

*Example:* The area under the supply curve is \_\_\_\_\_.



*Example:* How much money is actually collected by the producer when selling 4 units?

*Example:* The amount the supplier would have been willing to accept for those 4 units is given by \_\_\_\_\_.

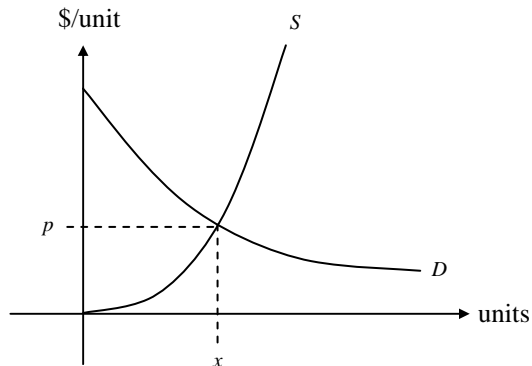
The producer surplus is the benefit that producers enjoy from the actual amount collected being more than what they were willing to accept.

*Example:* Using the graph above, label the geometric interpretation of producer surplus..

*Example:* The producer surplus is given by the equation \_\_\_\_\_.

*Putting it Together*

*Example:* Consider the following Supply and Demand Curves:



- Label the equilibrium price.
- Label the consumer surplus.
- Label the producer surplus.

*Example:* Let  $D(x) = 7 - x$  for  $0 \leq x \leq 7$  be the price, in dollars per unit, that consumers are willing to pay for  $x$  units of an item. Let  $S(x) = 2\sqrt{x+1}$  be the price, in dollars per unit, that producers are willing to accept for  $x$  units. (We already found the equilibrium point earlier).

a) Sketch a graph and label the equilibrium point, the consumer surplus, and the producer surplus.

b) Find the consumer surplus.

c) Find the producer surplus.