Definitions
Please explain each term in three lines or less!

- Opportunity cost
  The value of the best forgone alternative
- Ceteris paribus
  Other things equal
- Homo economicus
  Entirely selfish
- Demand
  Demand is the relationship between the quantity of a good and the price at which the consumer is willing to pay to obtain it.
- Supply
  Supply is the relationship between the quantity of a good and the price at which the producer is willing to pay to manufacture it.
- Equilibrium
  Equilibrium is the price and quantity of a good at which the exchange between producers and consumers can persist.
- Demand elasticity
  The percentage decrease in quantity that result from a small percentage increase in price
- Supply elasticity
  The percentage increase in quantity that result from a small percentage increase in price

Word problems
Please explain each question in a few sentences. Answers may vary.

- Opportunity cost
  o What is the U.S. government’s opportunity cost of providing universal health care?
    The 940 billion can be spent on perhaps an alternative way of improving the current health care system without providing universal health care, maybe an entirely different way of spending the money—increased funding at higher education institutions, cancer research...
  o What is your opportunity cost of attending Ec 11 lectures?
    Taking a nap, watching TV, doing physics homework...
  o What is the opportunity cost of getting a puppy?
    The cost of getting a puppy not only includes the price you pay for the puppy but also includes the vet, food costs and the time you spend on the puppy. Instead, you could spend your time and money on buying new games, leveling up your characters...
- Complements & substitutes
  o What happens to the demand for 1% milk when the price of 2% milk increases?
    The demand for 1% milk is likely to increase since 1% milk and 2% milk are substitutes.
• What happens to the demand for hides consumers when the price of beef decreases because become more worried about cholesterol?
  *The price of beef has gone down because beef is less demanded. Thus producers will want to raise fewer cattle. Thus the price of hides will go up. And the quantity demanded will go down.*

• What happens to the demand for hides when the price of beef decreases because a drought forces supplier to bring more animals to market?
  *The price of hides will fall because more the supply of cattle has increased.*

• What happens to the supply of civilian aircraft in the U.S. when the U.S. declares war?
  *Civilian aircrafts and war aircrafts are manufactured from the same types of raw materials and using the same types of equipment. War efforts would increase the demand for war aircrafts and subsequently their prices; hence the manufacturers would divert the raw materials and equipment towards manufacturing of war aircrafts and decrease the supply of civilian aircrafts. Civilian aircrafts and war aircrafts are substitutes in supply.*

• Suppose corn and wheat can grow on the same type of land. What happens to the supply of wheat when the price of corn increases?
  *The supply of wheat would decrease as it is more profitable for farmers to grow corn—corn and wheat are substitutes in supply.*

• Supply & demand
  • Why does marginal cost of the producer equal price?
    *Suppose the producer produced at marginal cost > price, then he would be losing money for each additional product he produces. Now suppose the producer produced at marginal cost < price, then he is willing to produce more of his product.*
  • Why does marginal value of consumer equal price?
    *Suppose the consumer bought the good at marginal value < price, then he would be paying for more than he is benefiting for each additional product he bought. Now suppose the consumer bought the good at marginal value > price, then he is willing to consume more of the good.*

• Elasticity
  • Explain why gas is inelastic on the short term and elastic on the long term.
    *On the short run the quantity of gas consumers consume does not change much as price fluctuates because people cannot immediately change their driving behavior (e.g. commute to school and work, the fuel efficiency of their vehicles). However, on the long run, consumers can adopt more fuel efficient cars, car pool, and public transportation to accommodate for change in gas prices.*
  • Describe and explain the long term and short term elasticity of luxury goods (e.g. designer purses, clothing, cars)
    *The elasticity of luxury goods is high on the short run and long run as people can fairly easily forgo luxury goods and adopt for cheaper substitutes—this is something we observe in recessions.*
Technical problems

- For the following questions, use a diagram with supply and demand curves to explain the effects of the given shock on the equilibrium price and quantity (i.e. draw any shifts of the demand or supply curve and equilibrium). Explain whether there is a shift in the demand curve, supply curve or neither.\(^1\)
  
  o What happens to demand curve of VHS when DVDs are introduced?
  
  The demand curve of VHS shifts to the left when DVD is introduced as consumers will switch to using DVD; DVD and VHS are substitutes. Assuming the supply of VHS stays constant, the equilibrium price and quantity will decrease.

  ![Supply and Demand Diagram](image1)

  o The Los Angeles Metro decides to increase the price of a metro pass from $1.25 to $2.00, and also increase the price of monthly metro passes. Show the effect on demand, supply and on the equilibrium price and quantity in the Los Angeles area for used cars. Are monthly metro passes and cars substitutes or complements?
  
  Consumers will probably opt to drive instead of taking the metro in response to the increase in metro fares. So the demand of used cars increases, the supply of used cars stays constant, the equilibrium price and quantity increase. The monthly metro passes and cars are substitutes; monthly metro pass holders probably use the metro as their primary form of transportation instead of cars.

  ![Supply and Demand Diagram](image2)

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\(^1\) Cite as: William Wheaton, Chia-Hui Chen, Rongzhu Ke, Monica Martinez-Bravo, Marco Migueis, Peter Schnabl, and Hongliang Zhang, course materials for 14.01 Principles of Microeconomics, Fall 2007. MIT OpenCourseWare (http://ocw.mit.edu/), Massachusetts Institute of Technology. Downloaded on [02 04 2019].
- The American South was the biggest producer of cotton. The civil war significantly reduced the quantity of cotton produced by the United States. Show the immediate effect on the world cotton market.

- Suppose the popularity of a new fad diet causes consumers’ tastes to shift away from bread. Show the effect on the market for butter, which is used mainly when people eat toast.

  *Butter and bread are complements in this case, so a decrease in demand for bread corresponds to a decrease in demand for butter. This causes the demand curve to shift to the left and the equilibrium price and quantity to decrease.*

- Suppose the burger industry has two firms A and B. The supply curves for firms A and B are both . What is total supply curve for burgers?

  *The total supply curve for burgers is* 

  Easy to verify:

<table>
<thead>
<tr>
<th>Price</th>
<th>Quantity supplied by firm A</th>
<th>Quantity supplied by firm B</th>
<th>Total quantity supplied</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
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<td>...</td>
</tr>
</tbody>
</table>

- Suppose the supply curve for burgers is . What is the equilibrium price and quantity of burgers? Draw the demand, supply curves and the equilibrium. Shade and label the consumer and producer surplus. Compute the supply elasticity and demand elasticity at .
The equilibrium price is 8 and equilibrium quantity is 2. Consumer surplus is the area shaded pink; producer surplus is shaded blue.

Supply elasticity at \( q = 3, p = 2 \cdot 3^2 = 18 \):

\[
e_s = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} = \frac{1}{2 \sqrt{2} P} \cdot \frac{P}{Q} = \frac{1}{2 \sqrt{2} \cdot 18} \cdot \frac{18}{3} = \frac{1}{2}
\]

Demand elasticity at \( q = 3, p = 10 - 3 = 7 \):

\[
e_d = - \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} = -1 \cdot \frac{7}{3} = \frac{7}{3}
\]

Mathematica commands for generating the plot:

```mathematica
Needs["PlotLegends"]
plot1 = Plot[{s[x], d[x]}, {x, 0, 3}, AxesLabel -> {"q", "p"}, PlotStyle -> Thick, Filling -> {1 -> {{2}, {LightBlue, White}}, 2 -> {{2}, {LightPink, White}}},];
plot2 = ListPlot[{{2, 0}}, PlotMarkers -> (Automatic, Medium), PlotStyle -> Black];
legend = {Graphics[Thickness[0.1], Purple, Line[{{0, 0}, {1, 0}}]], "s=2p^2"}, {Graphics[Thickness[0.1], Blue, Line[{{0, 0}, {1, 0}}]], "d=10-q"}, {Graphics[PointSize[0.3], Point[{2, 0}]], "Equilibrium (2, 8)"]};
ShowLegend[Show[plot1, plot2], {legend, LegendShadow -> None, LegendSize -> {1.2, 0.5}, LegendPosition -> {1, -0.5}]}]