Question 1: Consider a competitive market for which the quantities demanded and supplied per year at various prices are

<table>
<thead>
<tr>
<th>Price (Dollars)</th>
<th>Demand (Millions)</th>
<th>Supply (Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>60</td>
<td>30</td>
</tr>
<tr>
<td>25</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>30</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>40</td>
<td>25</td>
<td>90</td>
</tr>
</tbody>
</table>

(a) Calculate the price elasticity of demand when the price is 25 and when the price is 30.
(b) Calculate the price elasticity of supply when the price is 25 and when the price is 30.
(c) Determine the equilibrium price and quantity
(d) Suppose the government sets a price ceiling of 20. Will there be a shortage? If yes, what is excess demand?

Question 2: Suppose you have the following information about the demand and supply of wheat in the U.S.:

<table>
<thead>
<tr>
<th>Price</th>
<th>U.S. supply</th>
<th>US. Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>20</td>
<td>42</td>
</tr>
<tr>
<td>10</td>
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<tr>
<td>20</td>
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<td>70</td>
<td>37</td>
</tr>
<tr>
<td>50</td>
<td>110</td>
<td>33</td>
</tr>
</tbody>
</table>

(a) Determine the equations of the supply and demand curves
(b) Determine the market equilibrium price and quantity.
(c) Now suppose that the US can import an arbitrary quantity of wheat at a price of 10 Dollars. How many units will the U.S. import?
(d) If the US can import an arbitrary quantity of wheat at a price of 20 Dollars, how many units will the U.S. import?

Question 3: The market for DVDs has supply and demand curves given by 

\[ P = 2Q_s \]

and 

\[ P = 42 - 5Q_d \]

(a) How many units will be traded at a price of 35? How many at a price of 14.
(b) What is the market equilibrium price?
(c) What is the total revenue from DVD sales in the market equilibrium?
(d) Now suppose a tax of 9 Dollars per DVD is introduced.
   a. How does this affect the equilibrium price?
   b. What is total after tax revenue from DVD sales?
   c. Determine the government’s tax revenue?

Question 4: Suppose the demand for new and old apartments is given by 

\[ Q_d(P) = 200 - 0.1P \]

and the supply curve for old apartments is \( Q_s^O(P) = 30 + 0.03P \). The supply curve for newly built apartments is \( Q_s^N(P) = 20 + 0.02P \).

(a) Determine how the equilibrium price \( P \), and how many apartments are built.
(b) Now suppose that the city government decides to control rents. That is, no landlord is allowed to ask for a rent that exceeds 600 Dollars. How many new apartments are being built now? Suppose that everyone who cannot find an apartment leaves the city. How many people will leave?

(c) Now suppose that instead of rent control, the government chooses to subsidize the building of new apartments. That is, the government pays 400 Dollars to landlords of any newly built apartments. Thus, the supply of new apartment is now given by $20+0.02(P+400)$. Determine the new equilibrium price $P$. Determine how many new apartments are built now and compute the total subsidy paid by the city government.

**Question 5:** Suppose that the price elasticity of demand for cigarettes is $-0.1$ and the price elasticity of supply is 0.5. The current price for a pack of cigarettes is 4 Dollars, and 400 billion packs of cigarettes are consumed annually.

(a) Determine the linear demand and supply curves for cigarettes.

(b) The government wants to reduce the consumption of cigarettes by imposing a tax of 2 Dollars per pack. Let $P^*$ be the new equilibrium price. Then, as a consequence of the tax, the buyer pays $P^*+2$ Dollars for each pack of cigarettes. The seller still receives $P^*$ Dollars per pack, and the supply curve therefore does not change. Determine

(i) The equilibrium price $P^*$.

(ii) By how much does the tax reduce cigarette consumption.

(iii) The government’s revenue from the cigarette tax.

**Question 6:** Suppose that the price elasticity of demand for copper is $-0.1$. The price elasticity of supply is 0.02. At a price of 1 Dollar per pound, $Q=10$ Million tons of copper are supplied and demanded.

(a) Determine the linear supply and the demand curve for copper.

(b) Suppose that demand for copper drops by 10 percent. Determine the percentage change of the equilibrium price and quantity.

**Question 7:** Using diagrams, show what changes in price and quantity would be expected in the following markets:

(a) Worries about air safety and inconvenience of security checks cause travelers to shy away from air travel. Determine the effects on:

   a. Air travel
   b. Rail Travel
   c. Hotel Rooms in a tourist destination in your country

(b) A genetically engineered hormone enables large milk producers to cut production costs. Determine the effects on:

   a. Milk
   b. Small producers