Section C: Short Essay

A.
Ken, a computer software entrepreneur, is considering halving the price of the software that he sells, because he estimates that such a price reduction will double his revenue. With the aid of diagrams, explain whether Ken is likely to be correct.

Software is a particularly interesting economic good, as it is easy to produce more copies of, and as easy to distribute. This essay will describe, using the concepts of price elasticity of demand and supply, and revenue, in order to decide if Ken, a software engineer, would be correct to halve the price of his software anticipating a doubling in his revenue.

We define the following terms as such, and their values using the equations:

- Price Elasticity of Demand (PED): The responsiveness of Demand according to a change in Price, calculated as: $PED = \frac{\Delta Q_D \%}{\Delta P \%}$
- Price Elasticity of Supply (PES): The responsiveness of Supply according to a change in Price, calculated as: $PES = \frac{\Delta Q_S \%}{\Delta P \%}$
- Revenue: The amount of money that the firm generated (income of the firm) during a period, by the sales of an economics good; the amount of which is equal to Price * Quantity Sold.
  (Equal to the area of a rectangle whose two sides are on the Price and Quantity axis, at a point in the demand curve)

We assume that PED and PES are both relative when described as "inelastic" or "elastic," and are on a fixed scale.

Software requires very little cost to produce, as they can be copied infinitely and distributed via the internet, and the suppliers can therefore respond very quickly to changes in price. This makes software supply very price-elastic; in other words, software has a high PES, and the supply curve is relatively flat. This can mean that as price is decreased, the revenue will not increase much, or even will decrease.

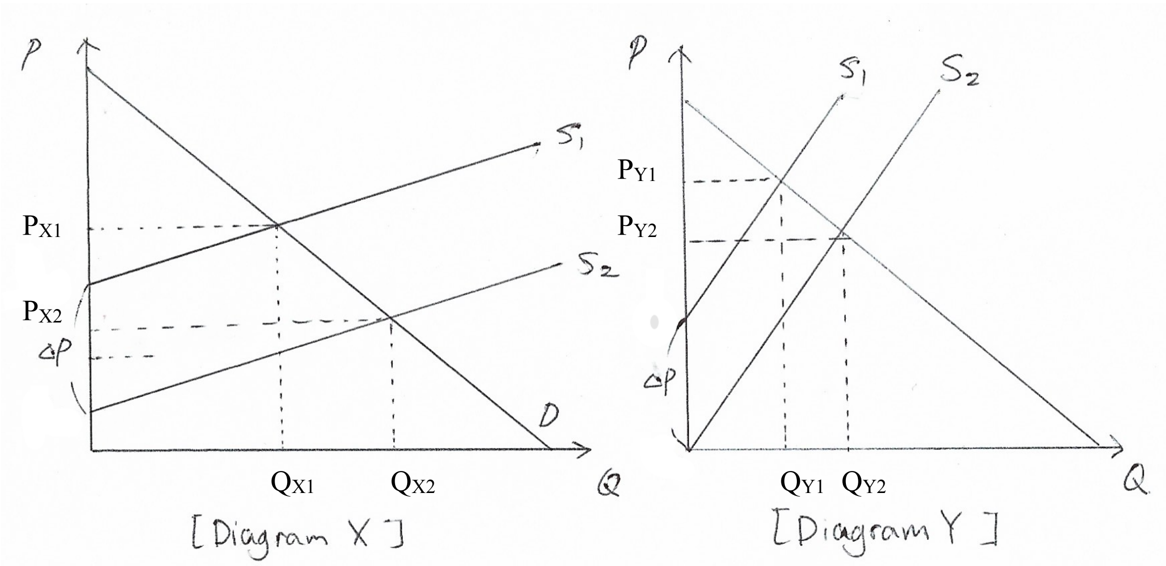
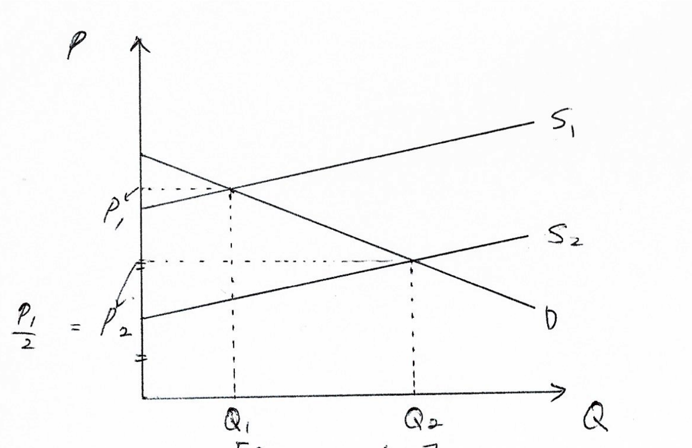


Diagram X shows a elastic supply curve, while Diagram Y shows an inelastic supply curve, with the same demand curve, and the same downward shift of the Supply curve of ΔP. We can see that while in Diagram Y, the area representing the revenue, $P_{Y1} \cdot Q_{Y1}$, increases dramatically as price decreases to P_{Y2}, to $P_{Y2} \cdot Q_{Y2}$. However, in Diagram X, the area representing the revenue $P_{X1} \cdot Q_{X1}$ does not change much when price is decreased to P_{X2}, $P_{X2} \cdot Q_{X2}$. We can see that when the supply in price-elastic, the revenue is not increased as much, or even decreased, when price is reduced by the same amount. However, this may not be correct, as for software, the elasticity can be changed, because of the unique versatility of the good.

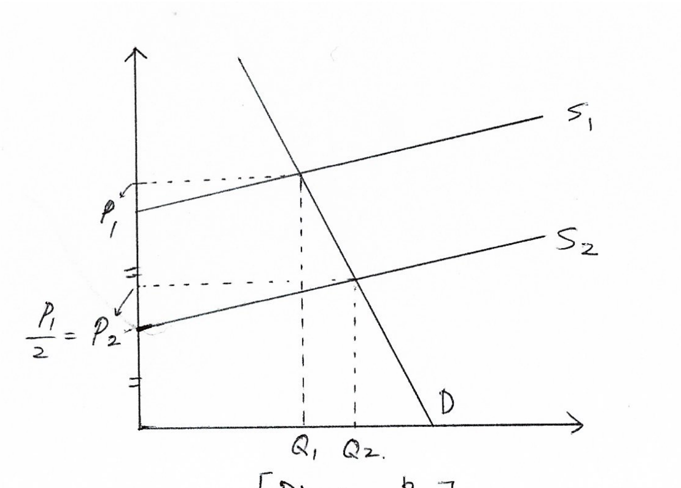
Ken predicts that as he halves the price of the software, the quantity demanded will increase greatly, therefore doubling his revenue. This can be true when the demand if very price-elastic, which implies that consumers will demand higher quantities even with a small change in price; therefore, if this is the case, when Ken halves the price, quantity demanded will increase greatly. As a result, due to this huge increase in quantity demanded, his revenue overall will increase greatly.



[Diagram A]

We can see this in diagram A, in which the demand is very elastic. As the revenue is calculated as $P \cdot Q$, the area $P_1 \cdot Q_1$ is his initial revenue, and $P_2 \cdot Q_2$ is the new revenue. There has been a great increase in the total revenue, as $Q_2 - Q_1$is large.

However, Ken may be wrong if the price elasticity of demand is very inelastic; if consumers are not very responsive to price, and quantity demanded does not increase much even if Ken reduces the price, his profit will not increase much.

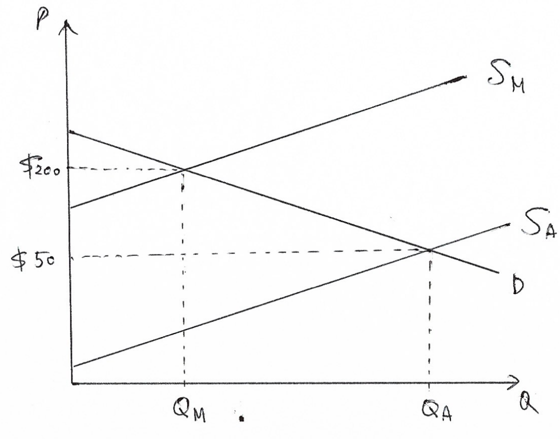


[Diagram B]

We can look at diagram B to visualize this; with a steep, inelastic demand curve, even if price is dropped by the same amount as diagram A, $P_2 - P_1$, the change in demand, $Q_2 - Q_1$ is much smaller than that of diagram A, leading to a shrink in the area representing the revenue.

In real life, the elasticity of demand of software differs greatly depending on the type of software. For example, we can take a look at a crucial piece of software to every computer: the Operating System (OS). In the mid-2000s, Microsoft and Apple both introduced new versions of their OS, Windows Vista, and OSX Snow Leopard, respectively. Microsoft priced it at their usual price range of roughly $200, while Apple made a change to their price, dropping it to about a mere $50. We can infer that analysts from the two companies had differences in the expected PED of software; Microsoft assumed that the PED is more like one from diagram A, that reducing price would not cause a significant increase in price, stagnating revenue; while Apple assumed that PED is more like that of diagram B, that a reduction in price would increase the quantity demanded greatly, maximizing their revenue.

In was evident later on that Apple was much more successful in selling their new OS, while the new Windows Vista faced small adoption rates. Therefore, in the consumer OS market, we can see that the elasticity of demand is high. We can visualize this in the following diagram K.



[Diagram K]

Microsoft and Apple both supplied their respective OS software in the supply curve, S_M and S_A. We can see that as the demand curve for software is very elastic, however, both companies did not know this fact. Due the the elasticity of demand, we can see that the overall revenue of Apple, $50 \cdot Q_A$, is much larger than the revenue of Microsoft, $200 \cdot Q_M$.

However, this is not the case for all software. In the enterprise software market, the elasticity of demand is assumed to be low, because most of these software are deployed in huge numbers across multiple data centers, and choosing a brand of software will bind them to the same brand's future software.

Therefore, Ken may be correct to assume a doubling in revenue if the software he is developing has a high price elasticity, aimed mainly at individuals, such as an OS. However, if the software he is developing is for specialized enterprise environments, he would be wrong, as even if his software is halved in price, not many would change their pre-existing software ecosystems for just a small price benefit in the short-term.

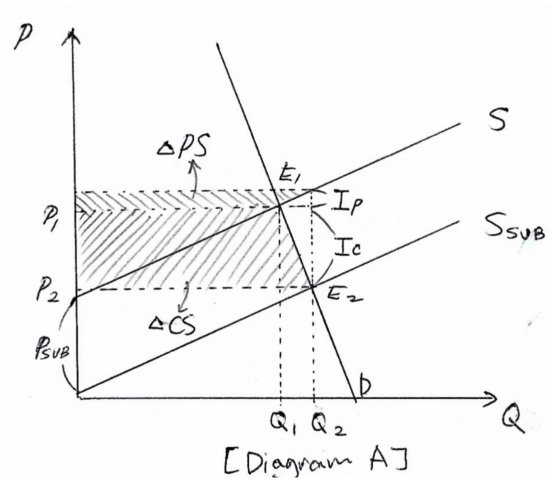
B.

Suppose a government gives subsidies to pharmaceutical firms in order to decrease the price of a medicine. Discuss the benefits and costs of such a policy for all the stakeholder (i.e. producers, consumers, the government, and the economy).

We define the following terms as such, in addition to the terms already defined in response a:

- Consumer Surplus: The benefit of the consumer by being able to purchase at a lower price than they were willing to pay
- Producer Surplus: The benefit of the producer by being able to sell at a higher price than they were willing to sell for
- Community Welfare: The sum of both Consumer and Producer Surplus
- Welfare Loss: The reduction in Community Welfare, due to taxation, subsidies, or other causes (also known as deadweight loss)

Medication, generally, is a necessity. People with illnesses require medication no matter its price, as even if the condition is not life-threatening, most consumers of medication in developed countries prioritize health over money. Therefore, we can infer that the demand of medicine is unresponsive to price: that demand is very inelastic. It is assumed, throughout this essay, that demand of medicine, in general, is price-inelastic. We can show it in the following diagram as a relatively steep demand curve D.



Both Consumer Surplus (CS) and Producer Surplus (PS) has increased by the amount shown on the diagram (ΔCS, ΔPS), as consumers enjoy a lower price of P_2, and producers receive the subsidies of P_{SUB} that reduce the costs of production; both producers and consumers are better off. (Calculations of change in CS and PS are dealt with in Section A and B)

As the demand is inelastic relative to the elastic supply, the Producer incidence (I_P), the benefit of the producer, is smaller than the Consumer Incidence (I_C), as shown on the diagram. This means that consumers are much better off than producers in this case, and the subsidy would have a considerable benefit to consumers as it would lower the price dramatically, while not reducing the costs of producers as much.

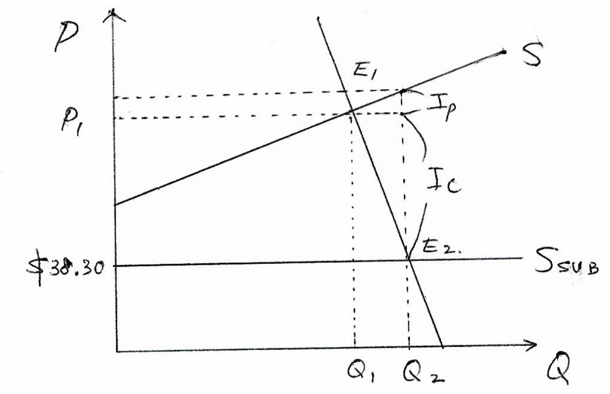
As producers have an increased quantity demanded and increased revenue, they are motivated to produce more, which requires more labor, and as a result, unemployment may decrease in the society. Also, the revenues of small producers with inefficient capitals are protected as well, although whether this is beneficial to the whole economy in the long term is a different topic.

For the government, the subsidy has lost them a part of their budget, which amounts to $(I_C + I_P) \cdot Q_2$, the amount they paid for the subsidy. Therefore, the government might not be able to subsidize other goods, or even have to reduce expenditure from other projects, for example infrastructure.

Society as a whole is worse off, however, as the amount spent by the government, $(I_C + I_P) \cdot Q_2$, is bigger than the increase of CS and PS, $\Delta CS + \Delta PS$. This means that there is a welfare loss, amount-able to the area that is not mitigated by the increase in CS and PS, $(I_C + I_P) \cdot (Q_2 - Q_1) \cdot 0.5$. This implies that there is an allocative inefficiency, due to the excess supply by the producers of $Q_2 - Q_1$.

As a real-world example, Australia has had a form of subsidy to prescription drugs, named the Pharmaceutical Benefits Scheme (PBS). Greatly simplified, its main program, called the Patient contribution, describes that for any prescribed drug, the patient would be subsidized so that they would pay only $38.30 maximum.

Although the following diagram would be painfully inaccurate as PBS is not a unit subsidy and contains much more detailed policies, we can at the very least draw a simple model of PBS.



[Diagram B]

The new supply curve, S_{SUB} would be parallel to the Q axis, as is requires that the pay for consumers would only be $38.30. As assumed, the demand is inelastic, meaning that also in this case, $I_C > I_P$, and that consumers are more better off than producers, although they both enjoy an increase surplus.

Analysts also estimate that the cost of PBS by the government is $7,600,000 in 2009, and therefore, government spending for the subsidy is equal to this: $(I_C + I_P) \cdot Q_2 = \$7.6$billion, meaning that the government would have an opportunity cost equal to $7.6 billion, or the other projects it could have funded using this money.

Subsidizing a particular good has effects on various economic entities; the consumer, producer, government, and, the economy as a whole. Therefore, careful analysis of the gains and losses of surpluses and welfare, as well as potential societal benefits, is required.