Section C: Short Essay

(a) Use a production possibility frontier to explain the concepts of scarcity, choice, and opportunity cost.

In this essay, we define the following terms as such:

- Scarcity: The limited availability of an economic good, factors of production, or resources, relative to the unlimited wants of people
- Choice: The decisions that economic entities have to make, due to the (above mentioned) scarcity
- Opportunity cost: The value of the best alternative when making a choice

As this essay will attempt to explain these terms, it is hard to define what they are before any detailed explanation. A clearer definitions will be constructed throughout the essay.

The fundamental problem of Economics is that there is unlimited wants compared to limited resources. This causes the problem of **scarcity**, meaning that people cannot have everything they want. Therefore, a **choice** needs to be made on the following three questions:

1. What to produce
2. How to produce
3. For whom to produce

A production possibility frontier graphically reveals the capability of the economy to produce a combination of two different goods, assuming that the production technology (efficiency), is constant, employment is at maximum, resources are used as efficiently and as fully as possible, ceteris paribus. The production possibility frontier, therefore, can be utilized to answer question 1: What to produce. The production possibility curve illustrates the possible choices of what the economy can produce with the **scarce** input resources (land, labor, capital, entrepreneur). The following is an example of a production possibility frontier:

[Diagram 1]
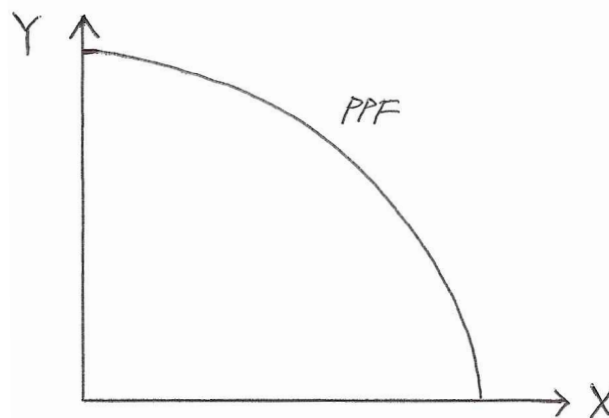
The economy has only a certain amount of resources it can use, therefore can either only produce a certain amount of good X while producing a certain amount of good Y, and therefore the economy has to make a balanced **choice** between the two. The line represents the difference points that the economy can be in; the ways that the economy can choose to be producing the two goods.

Choosing to produce one good over another (in this example, to produce X instead Y), inevitably incurs the incapability of producing the other product. In this case, the amount of production that the economy lost of Y, is the **opportunity cost** of producing X. Making a choice inevitably causes an opportunity cost to produce, the value of the best alternative choice when making a decision.

[Continued on the next page]

[Diagram 2]
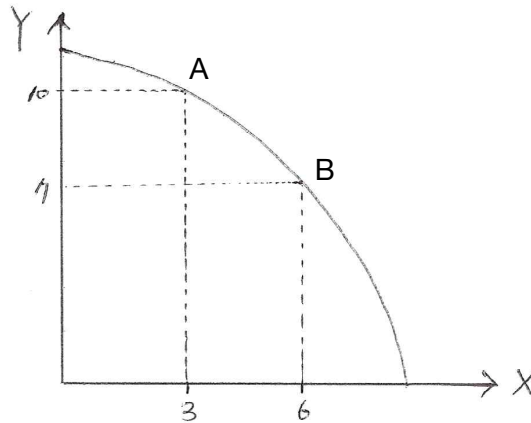
     In this example, the economy is currently producing at point A; it has previously made a choice to produce 10 units of Y, while producing 3 units of X. The economy now wants to produce 6 units of X (because demand has increased, or other such reasons). However, the economy can only produce along the line, due to the limited resources. Therefore, the economy has to move to point B, where it can produce 6 units of X, but can only now produce 7 units of Y. In this case, the opportunity of producing 3 more units of X, is 3 units of Y. By simple maths, we can conclude that the opportunity cost of producing 1 unit of X, is 1 unit of Y.

     To put a bit more realism into the example, let's say that good X is motorbikes, and Y is cars. The unit is in thousands per month:

[Diagram 3]
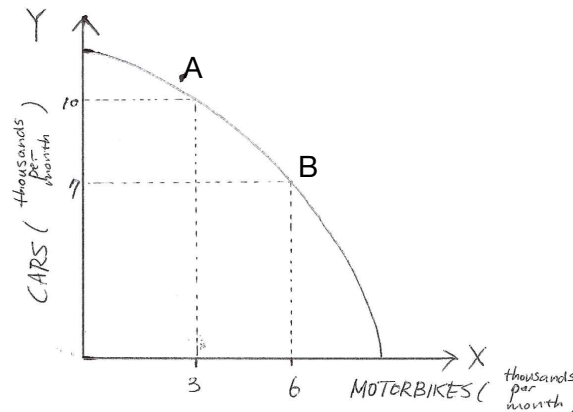
     The company has only a limited number of factories that can produce either motorbikes or cars. It is currently producing at point A, where it can produce 3,000 motorbikes a month, while producing 10,000 cars a month.

     However, last year, the government has put in place a new regulation that states: "Individuals can only buy cars when they have proven that they have enough parking space for each car." The company assumes that this policy will lead to the decline in the demand of cars, and alternatively, will cause an increase in the demand for motorbikes, as they are not part of the regulation.

     Therefore, the company, working for more profit, will want to produce more motorbikes, but still wants to produce a lot of cars, because cars are also profitable. Therefore, the company will consider shifting to point B, where they can produce more motorbikes, but less cars, due to the limitation of the number of factories. Precisely, the company can now produce 6,000 motorbikes, 3,000 more than before, but only 7,000 cars.

[Diagram 4]

	Motorbikes	Cars
Point A	3,000	10,000
Point B	6,000	7,000
Change	+3,000	-3,000

In this case, the company's **scarcity** in resources was the number of factories, which is a capital resource. Motivated by the new law, the company's **choice** was to make more motorbikes but this led to the fact that they could produce less cars. The **opportunity cost** of producing 3,000 more motorbikes, was 3,000 cars. We can calculate that the opportunity cost of producing 1 motorbike, therefore, is 1 car.

We have seen that a production possibility curve can reveal the basics underlying concepts in economics. However, a real economy is much more complicated than producing only 2 goods that can be shown in a PPC, and it would involve much more complicated models; but the fundamental concepts explored in this essay still holds true: the scarcity of resources; the need to make a choice; and the opportunity cost, the highest alternative value lost in making that choice.

(b) To what extent do the signaling / incentive function of price and the rationing functions of price work well to allocate scarce resources in a market economy?

The economic problems require that economic entities make a choice on these three questions:

1. What to produce
2. How to produce
3. For whom to produce

Without any intervention by an authority, it is the price which work to allocate the scarce resources in a free market. Therefore, the first two questions are mostly answered: What and how to produce, are incentivized and rationed by price. However, the third question is left unanswered: For whom should an economy produce goods? This essay will discuss on the capabilities and limits of the functions of price in a free market economy.

The following terms are defined as such:

- Free market: A system where prices of economic goods are solely determined by supply and demand
- Profit: The difference between the revenue and the cost; excess revenue over cost
- Utility: The satisfaction of the consumer by buying a good
- Price: The quantity of payment given in exchange for an economic good or service
- Rationing: The distribution of scarce resources, goods, or services. (In this essay, this is handled not by an external force, but only by price)
- Incentive: The motivation for producers or consumers that causes a rise or fall of quantity demanded or supplied
- 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

The scarcity of resources relative to the unlimited wants, limits the amount of goods that can be produced in an economy. Therefore, the concept of price emerges; assuming all else is constant, price is the sole variable that determines how much the good is supplied and demanded. With this simple idea, we can explain how price, in a free market will, distribute the limited goods, with the following assumptions: firms will always strive to maximize profit, and consumers will always strive in maximize utility. The price acts as an incentive, signaling to both entities to increase or decrease demand or supply, moving along the curves in order to reach an equilibrium, where just the right amount of goods are produced and supplied. Even when the demand or supply curve shifts due to other factors, this "invisible hand" of price will work in order to reach a new equilibrium. For example:

[Diagram 1]
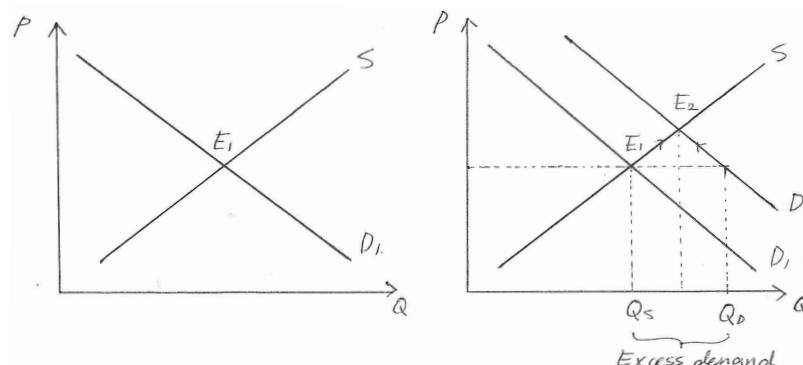
1. The market is currently at the equilibrium, E1
2. Demand for a certain good increases, due to external factors, from D1 to D2
3. Producers notice that the good is flying off shelves, and see that their stocks are empty. Trying to maximize profit, they increase the prices. In turn, supply is increased as well (incentive function of price)
4. Consumers notice this increase in price, and therefore the quantity demanded of the good decreases (rationing function of price)
5. The quantity supplied and demanded meet at the new equilibrium E2

This is a simple example of the rationing function of the price, when if demand increases, suppliers notice that their stocks are empty, and the prices rise, and discouraging excess demand to meet at the equilibrium, where quantity demanded meets quantity supplied. A good real-life example is the production of DRAM. Computers are a necessity in this digital world, and therefore the prices of its components, one of the most crucial being DRAM, which stands for Dynamic Random Access Memory. This is one of the products that allow the massive advances in consumer as well as enterprise computing technology.

In recent years, there has been a surge in the demand for this component, due to the increased demand by consumers for cloud computing resources as well as as a new use for it as a permanent storage device; Micron, a major producer, revealed that during 2012 to 2017, DRAM demand per bit has increased 27%. In effect, in the second half of 2016, the prices of DRAM started to climb. DRAMexchange analyzed that in both Q4 of 2016 and Q1 of 2017, DRAM prices have increased up to 30%, resulting in skyrocketing prices for these components. Due to both increasing demand and supply reduction, DRAM prices continue to rise, and therefore the price of components, as well as consumer electronics, rise. In effect, the demand for these goods have decreased, and less people are buying new electronics, while enterprises also reduce their computer infrastructures.

This case provides a good example of how increasing demand causes the increase in prices, in turn signaling to producers to increase the supply, as well as deterring (de-incentivizing) the demand, to rationing the good. This can be modeled by a very simplified model below:

[Diagram 2]
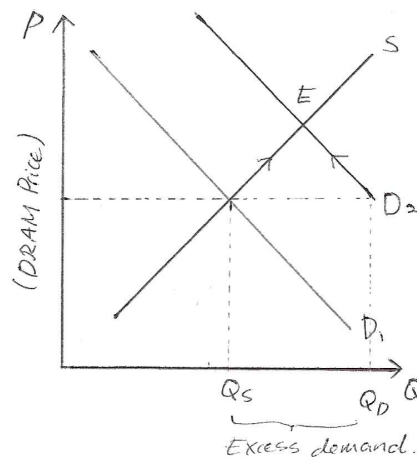
1. The increase in the use of smartphones, as well as a growth in the cloud computing industry, causes the demand curve for DRAM to shift to the right, from D1 to D2(increased demand).
2. Producers notice that stocks are empty, and they increase the price, and quantity supply of DRAM increase along the supply curve S. (incentive function of price)
3. Consumers notice the increased price of electronics, and quantity demanded of electronics, and therefore DRAM, decreases along the new demand curve D2. (rationing function of price)
4. The demand and supply meet at the equilibrium, where adequate amount is produced and consumed.

This movement towards the equilibrium, where there is, ideally, no shortage or excess in supply or demand, and where community welfare is maximized, is where the the model views as an ideal situation. In this point of "Maximum allocative efficiency," the economy is allocating the scarce resources in the best way possible, to produce the right amount of the good that is wanted by the society.

However, this ideal does not take into consideration a crucial ethical dilemma: Is the most efficient way, the most morally right way? The market does not take into account the fairness of a choice, only its efficiency, motivated by price. To view this in a more realistic perspective, let's view a real life situation: Universities. The university's capacity is the scarce resource; they can only allow up to a certain number of students per year. Universities are indeed an economic entity, and therefore will pursue profit. However, the purpose of a university is education, and by solely operating on profit to admit students, they would face problems, ethical and practical. Underperforming students from wealthy families will get a chance for higher education, while hard-working students from families with lower income will not get a chance. Therefore, to prevent the universities from operating only on profit, the government may impose a limit on tuition so that poor students can also afford the price: imposing a price ceiling:

[Diagram 3]
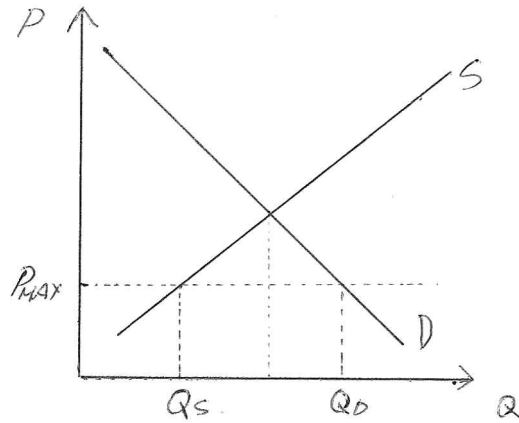
QD > QS, or in other words, the number of students applying is greater than the number of students that the capacity of the college. However, because the price is fixed a Pmax, the university cannot determine weather the student is admitted or not by the price; therefore, they will look at their academic achievements. This way, universities is motivated admit the high-achieving students, regardless of their income, into the universities.

This shows how price is not suitable for using as the sole signal in certain situations, where other values, such as providing quality education to hard-working and high-achieving students, is more important than maximizing profit.

The model also does not take into consideration that in the real world, there are goods with huge demand, but the scarcity of resources, or the technology, limit its maximum quantity that can be supplied. A real-world example of this would be the recently released smartphone from Apple, iPhone X. Due to difficulties in producing the new display, as well as limited raw materials for its manufacture, many suppliers and market analysts suspect that the demand for the phone will greatly exceed the supply. No matter how high Apple prices these phones, the technology, and limited resources, limits the the maximum quantity supplied. In this case, the Supply and Demand curve will look like the following:

[Diagram 4]
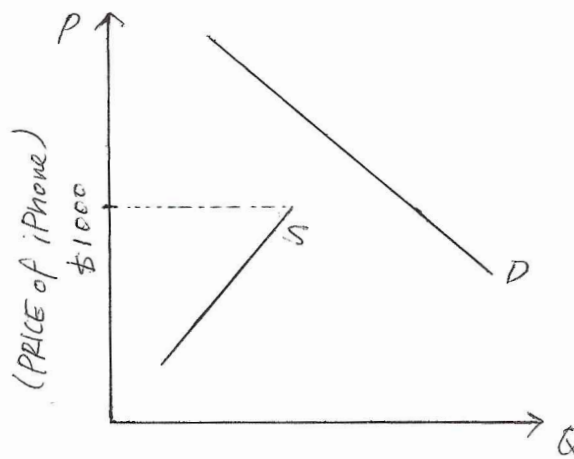
Apple has tactically priced the iPhone X at a much higher price of $1000 compared to last-year's flagship model. But even if the higher price deters consumer demand, the supply curve still cannot meet the demand curve. In this case, because there are limits to the resources and technology, the only choice would be to wait for other factors that would decrease demand. In the iPhone's case, it would be to wait for the excitement towards the new phone to die down.

[Diagram 5]
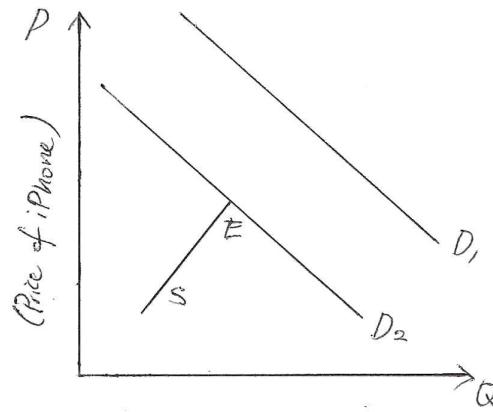
1. Technological limits mean that supply cannot meet the demand curve D1
2. Time passes, and as consumers are less excited for the new phone, the demand curve shifts to D2
3. The two curves meet, and price can now work as an incentive to move the market towards the equilibrium, E

This shows that in real life, there are many other factors that limit the supply, and therefore, in some cases, the price cannot be used as an incentive to ration the good.

It is easy to simply model supply and demand according to a single independent variable, and it does indeed offer us insights into how people are incentivized, and how price can distribute the scarce goods in a free market. However, there are many more factors that affect demand and supply, and many of them are hard to model. Therefore, we always need to take into consideration what these other factors will lead to, and as consumers and producers, act, not only according to the signals of price, but morally and ethically as well.