Extra practice questions

Exam-specific instruction

1. Each question in this exam is worth 1 mark.

2. Unless prior permission is given, you have two hours to complete the exam.

3. Questions can be multiple choice, true-false, fill-in-the-blank(s), or multiple responses.

4. For fill-in-the-blanks or multiple responses questions, no partial marks are awarded. When in doubt, round off to the nearest 2 decimal places unless stated otherwise.

5. For multiple choice questions with options like "all statements are true/false" or "multiple statements are true/false":

- "Statements" refers to substantive choices only (i.e. the options with actual economic content).

- If the question asks you to select the false statement and multiple substantive statements are false, choose the option "more than one substantive statement are false". If the question asks you to select false statement and there are no false substantive statements, choose the option "all substantive statements are true".

- Basically, ignore circular logic issues.

6. Unless otherwise specified, make standard assumptions, i.e. demand curves slope down, supply curves slope up, people have typical preferences, etc. For monopoly market structures with market power, unless otherwise specified, assume that firms are uniform-pricing.

I acknowledge that I have read this notice __

As we move right along an indifference curve, the utility of a consumer decreases.

A. True
✓B. False

By definition, the indifference curve holds utility constant.

6-months-old Henry would always choose to drink whenever he is offered milk. From this, we can tell that his marginal utility of milk is:

A. negative, but becoming less negative as quantity increases.
B. negative, and becoming more negative as quantity increases.
C. positive, but becoming less positive as quantity increases.
D. positive, and becoming more positive as quantity increases.
✓E. More than one substantive choice are possible.
F. None of the substantive choices are possible.

Always choose to drink means that his MU is positive. But this tells us nothing about whether each additional unit gives more or less satisfaction. So E.

Kenneth's six-year-old daughter refuses to eat her vegetables. From this, we can tell that her marginal utility of vegetables is:

A. negative, but becoming less negative as quantity increases.
B. negative, and becoming more negative as quantity increases.

C. positive, but becoming less positive as quantity increases.

D. positive, and becoming more positive as quantity increases.

✓E. More than one of the choices are possible.
F. None of the choices are possible.

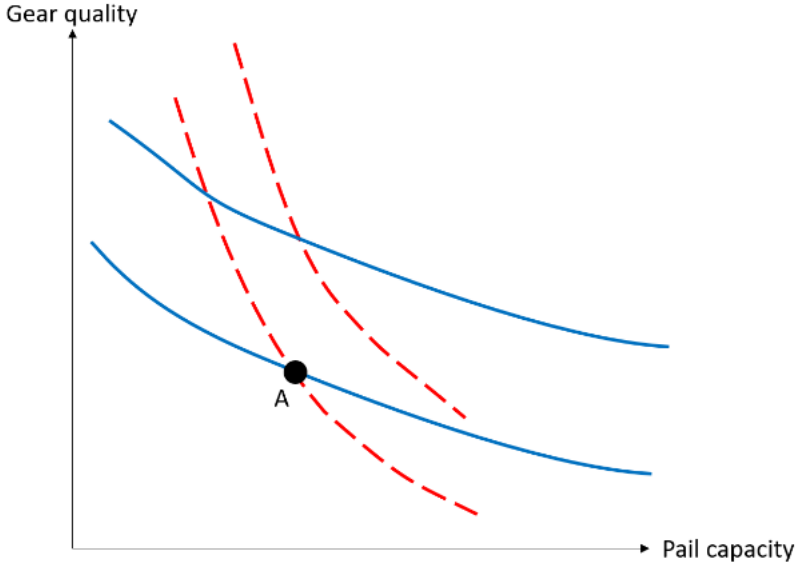
If Kenneth's daughter refuses to eat her vegetables, she must be viewing it as a bad. So utility must be decreasing, i.e. the options must be either A or B. But now we are out of typical preferences regime, so we don't know how it changes as quantity increases. So both A and B are possible.

Suppose we had a "good" and a "bad", with the corresponding versions of nonsatiation. If we plotted the indifference curves between these two commodities with the "good" on the horizontal axis (x-axis), the indifference curves will:

A. Slope downwards.
✓B. Slope upwards.
C. Be perfectly horizontal.
D. Be perfectly vertical.

If we increase the good by 1, utility goes up by nonsatiation. To bring us back to the original utility, we need to give the person more of the bad. This reduces utility by nonsatiation (of a bad), and at some point we get back the original utility. Draw out the indifference curve based on this, and you should see that it slopes upwards.

Jack and Jill have preferences over hill-climbing gear quality and pail capacity. In the following figure, Jack's indifference curves are represented by the solid blue line, while Jill's indifference curves are represented by the dashed red lines.



Select the **true** statement.

A. Based on these indifference curves, Jill dislikes larger pails.
B. Based on these indifference curves, better quality gear brings Jack more utility than Jill.
✓C. Suppose Jack and Jill both had gear quality and pail capacity given by bundle A. Then Jack would be more willing to give up pail capacity to obtain better quality gear than Jill.
D. More than one substantive statement is true.
E. All substantive statements are false.

A is false; these are typical ICs, which means that these are goods.
B is false; the ICs do not show utility levels but comparisons between bundle of goods. The number of utils has no meaning beyond allowing comparison across bundles; the same is true for across individuals.
C is true; this is the definition of the MRS, and the MRS is the slope of the indifference curve.

Select the **false** statement.

A. When income increases, the budget constraint of an individual will shift outwards.
B. The slope of the indifference curve (in absolute value) tells us the relative valuation between two goods from the perspective of the consumer.
✓C. For typical preferences, the marginal rate of substitution is always negative in value.
D. For typical preferences, the marginal utility is always positive in value.
E. More than one statement are false.
F. All statements are true.

The MRS is always positive in value (as defined in our class, because it is equivalent to the ratio of the MUs, which are always positive).
A, B, and D are directly from the slides.

Which of the following statement(s) about indifference curves for typical preferences are **false**?

A. ICs cannot cross.

B. ICs are concave to the origin.

C. ICs increase in the NE direction because of diminishing marginal utility.

D. Bundles that are on two different ICs must give consumers different levels of satisfaction.

✓E. More than one statement are false.

F. All the statements are true.

ICs are convex to the origin, so B is false. C is false too, because ICs increase in NE direction because of nonsatiation, not DMU.

We have two goods, food and clothes. Consider a usual budget line. Suppose the price of clothes decreases by 10%, and the price of food decreases by 10%. Compared to the initial budget line:

A. the final budget line is a rotation inwards about the food axis.
B. the final budget line is a rotation outwards about the food axis.
C. the final budget line is a rotation inwards about the clothes axis.
D. the final budget line is a rotation outwards about the clothes axis.
E. the final budget line is a parallel shift inwards.
✓F. the final budget line is a parallel shift outwards.

Look at the two intercepts. The prices both go down by 10% each, so the two intercepts go up by 10% each. This is exactly how we talked about the income changes in class, so this is a parallel shift outwards.

This is question 1 of a two-part question. Be sure to retain your working and final answer(s) for the next question.
Romeo has preferences over chocolates C and flowers F, with the associated utility function

$$U(C,F) = 3CF + 10C + 6F$$

. He has $60 to spend on chocolates and flowers on Valentine's Day. Suppose his utillity does not include any other goods (not entirely realistic, but let's make this assumption).
In January, he sees that the price of chocolates is $5 per piece, and the price of flowers is $3 per stalk.
Fill in the blanks. At these prices, Romeo will purchase __1__ pieces of chocolates and __2__ stalks of flowers.
(Round to at least 2 decimal places.)

1. Range - Min:5.99 Max:6.01
2. Range - Min:9.99 Max:10.01

Following the slides:

$$MU_C = 3F + 10$$
$$MU_F = 3C + 6$$
$$MRS_{CF} = \frac{3F + 10}{3C + 6}$$

Equating with price ratio gives

$$\frac{3F + 10}{3C + 6} = \frac{5}{3}$$

And rearranging this gives (call this Equation 1)

$$F = \frac{5}{3}C$$

Budget equation is

$$5C + 3F = 60$$

5*C + 3*F = 60

Substituting Equation 1 into budget equation gives

$$10C = 60$$
$$\Leftrightarrow C = 6$$

Then substituting this into either Equation 1 or the budget equation gives

$$F = 10$$

This is question 2 of a two-part question.
Romeo has preferences over chocolates C and flowers F, with the associated utility function

$$U(C,F) = 3CF + 10C + 6F$$

. He has $60 to spend on chocolates and flowers on Valentine's Day. Suppose his utillity does not include any other goods (not entirely realistic, but let's make this assumption).
Flowers and chocolates don't keep very long, so Romeo leaves the shop in January without buying anything. On Valentine's Day itself, he goes into the store again and discovers that flowers are now $12 per stalk. His preferences are the same (utility function above), the price of chocolates remains the same (at $5 per piece), and the amount he has to spend remains the same ($60).
Choose the **false** statement.

A. His budget line equation in February can be written as

$$F = 5 - \frac{5}{12}C$$

.

✓B. The bundle (C,F)=(6,10) is attainable.

C. He will purchase fewer stalks of flowers than he intended to back in January.

D. (a) and (b) are both false.

E. (b) and (c) are both false.

F. (a) and (c) are both false.

Option A is true because the budget line equation is

$$5C + 12F = 60$$

Which you can rearrange to get option A as in the slides.

We have two goods, x and y, with (x,y) being a bundle. We see a consumer choosing between three bundles: (6,2), (2,4), and (4,4). She is indifferent between (6,2) and (2,4), but she prefers (4,4) to (6,2). Which of the following are **valid** statements about her preferences?

A. One possible utility function that we can use to represent her preferences is
$U(x,y) = xy^2$

B. Assuming she has typical preferences, she will definitely prefer bundle (5,3) to (4,4).

C. Assuming she has typical preferences, she will definitely prefer bundle (3,4) to (6,2).

D. It is possible that x and y are perfect complements to her.

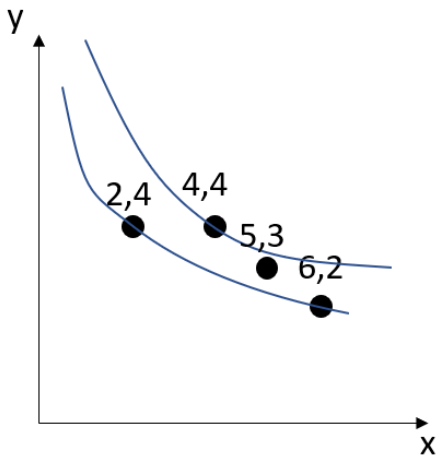
✓E. More than one statement are valid.

F. All the statements are false.

For these types of questions, it really helps to draw a diagram, so you should draw one as you think about the solutions below. See example for B.

A is not valid, just substitute (6,2) and (2,4) into the utility function and you will see that this doesn't give indifference between the two bundles. Most students got this.

B is not valid. You can draw indifference curves such that (4,4) is preferred to (5,3) while still satisfying the relationships in the question. E.g.



C is valid. By nonsatiation, she must prefer (3,4) to (2,4), since the former gives more of x and the same of y. And we know she is indifferent between (2,4) and (6,2). So she must prefer (3,4) to (6,2).

D is valid. You can draw perfect complements ICs that can explain her choice. Or if you prefer hard numbers, the utility function U(x,y) = min(x,y) will say that (6,2) gives the same utility level as (2,4) (both utility of 2), and (4,4) gives more utility than (6,2).

Abby has paid the entrance fee to be at a fair. She likes the teacups rides T and the roller coaster rides R, and only these two rides. Her preferences over the rides are given by

$$U(T,R) = TR + T + 2R$$

. Unfortunately, these are popular rides with queues. Each teacup ride takes half an hour to complete (including queue time), and each roller coaster ride takes one hour to complete. There is no charge for each ride (the entrance fee is all-inclusive), and Abby's only scarce resource is time, of which she has 8 hours.
Fill in the blanks. Based on this information, Abby will take ____ teacup rides and ____ roller coaster rides. (Round to at least 2 decimal places.)

Abby will take 8 teacup rides and 4 roller coaster rides
Here the scarce resource is time and not money. The total time she has is her budget (that's how much of the scarce resource she has to spend on the two goods), and the queue time is the price of each good (that's how much of the scarce resource is used up to obtain that good). Everything else maps to what you learn.

$$MU_T = R + 1$$
$$MU_R = T + 2$$
$$MRS_{TR} = \frac{R+1}{T+2}$$

Tangency condition:

$$\frac{R+1}{T+2} = \frac{0.5}{1}$$
$$R = \frac{1}{2}T$$

Budget line:

$$0.5T + R = 8$$

Substitute:

$$T = 8$$
$$R = 4$$

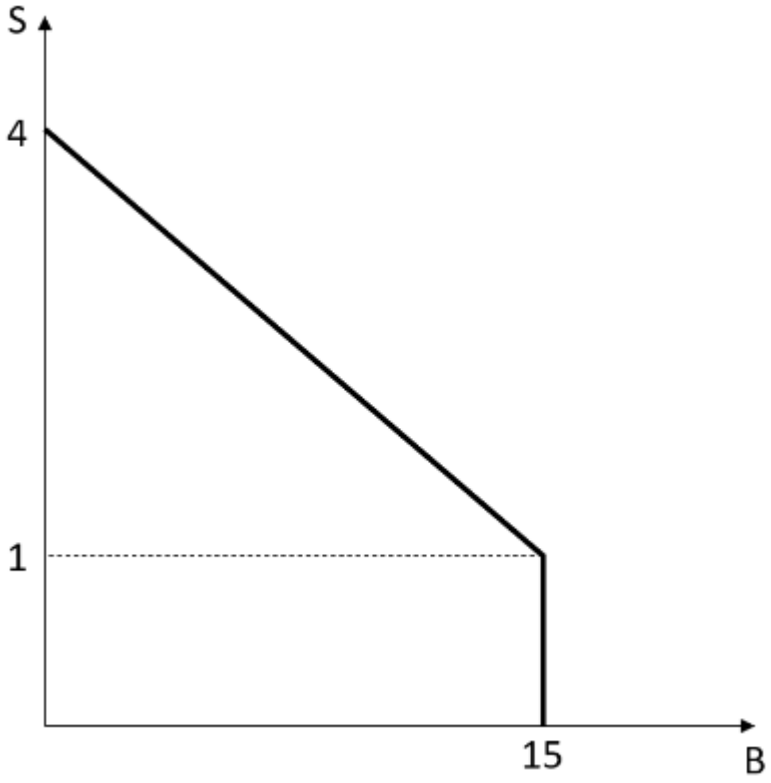
Akio consumes two goods, books and sweaters. His income is $24, the price of a book is $2, and the price of a sweater is $4. Suppose his girlfriend Beniko reminds him that he promised to buy her two sweaters for her birthday. He treasures this relationship so he intends to make good on the promise.
Suppose Akio's preferences over his own consumption of books and sweaters are given by the utility function U(B,S) = BS, and ignore all other possible items he might need to consume.
Fill in blanks. Akio will consume __1__ books and __2__ sweaters. (Round to at least 2 decimal places. Do not include the two sweaters for Beniko in your answer for sweaters.)

1. Range - Min:3.9 Max:4.1
2. Range - Min:1.9 Max:2.1

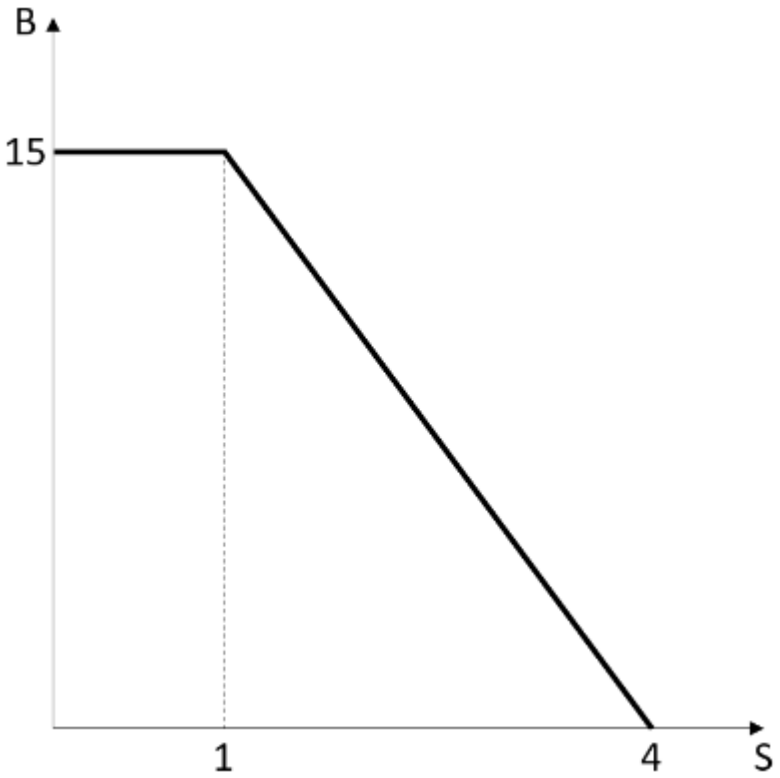
His income is effectively decreased by the cost of 2 sweaters, i.e. by 2*4=8. After accounting for this, his net-gift income is 24-8=16. Then, use the usual algorithm and you should get B=4 and S=2.

Akiko consumes two goods, sweaters (denoted by S) and books (denoted by B). Her income is $30, the price of a sweater is $10, and the price of a book is $2. Suppose Akiko's parents gives her one sweater for her birthday. She cannot return or resell the sweater (it's a gift!).
Select the **false** statement.

A. The following is a valid depiction of her budget constraint.



B. The following is a valid depiction of her budget constraint.



✓C. Suppose her utility function is U(S,B)=SB. Then she will consume 1 sweater and 10 books.

D. Suppose Akiko has typical preferences. Then she will never consume 0 sweaters and 15 books.

E. More than one substantive statement are false.

F. All substantive statements are true.

A and B are true. The budget line without the gift is the straight line between 3 on the S axis and 15 on the B axis. The gift shifts it outwards by 1 sweater, but since she cannot sell the sweater, there will be a kink at 1 sweater and 15 books. It also shouldn't matter what good you put on which axis, they are just mirror images (along the y=x line) of each other.

C is false. You can compute it, but the easiest way to see this is that her total expenditure from that bundle is 1*10+10*2=30, which is less than 40 (the sum of her income plus the dollar value of the gift of one sweater). Since the optimal bundle is always on the budget line, this cannot be optimal.

D is true. If she has typical preferences, she must have nonsatiation, which means that her ICs must slope downwards. If you try to draw any downward-sloping IC on the graph, you cannot possibly touch 15 books and 0 sweater only once. Intuitively, why would she consume 15 books and 0 sweater when she can consume 15 books and 1 sweater?

Darryl is hosting an end-of-semester party for his friends. He intends to buy alcohol A and food F for the party (which will be held off-campus since alcohol consumption is not allowed in halls). His preference over alcohol and food is given by the utility function U(A,F) =0.5AF +A +9F. He has 1000 dollars to spend, alcohol is 60 dollars per liter, and food is 10 dollars per kilogram. Ignore all other possible items he might need to buy.
Fill in the blanks. At these prices, Darryl will buy __1__ liters of alcohol and __2__ kilograms of food. (Round to at least 2 decimal places.)

1. Range - Min:-0.1 Max:.1
2. Range - Min:99 Max:101

$MU_A/p_A = (0.5F + 1)/60$
$MUF/p_F = (0.5A + 9)/10$
Equate and simplify, $F = 6A + 106$
B.C. is $60A + 10F = 1000$
Substitute, $60A + (60A + 1060) = 1000$
Simplify, $A = -0.5$.
So we have a corner solution. Set A to 0, you get $F = 1000/10 = 100$.

Suppose consumers have preferences over 2 goods x and y, and face usual budget lines. Select the **false** statement.

✓A. As the price of y increases, the budget lines will rotate inwards about the consumers' y intercepts.
B. For each individual consumer, the absolute value of the slope of the indifference curve gives the subjective relative value between x and y.
C. Suppose a consumer's preferences are typical. Then, a decrease in the price of y will lead to him/her consuming more of y (holding other factors constant).
D. Suppose we had many consumers with different individual demand curves for x. Putting price and quantity on the vertical and horizontal axes respectively, we obtain market demand by summing these individual demand curves horizontally.
E. More than one substantive statement are false.
F. All substantive statements are true.

A is false, it rotates about the x intercepts.
B is true, absolute value of slope of IC is the MRS, which tells us the subjective relative value (from notes).
C is true, demand is guaranteed to be downward sloping with typical preferences (from notes).
D is true, from notes.

There are three consumers in a market.
Amos has the following demand function:

$$q_A = \begin{cases} 3 - p & \text{if } p \leq 3 \\ 0 & \text{if } p > 3 \end{cases}$$

Betty has the following demand function:

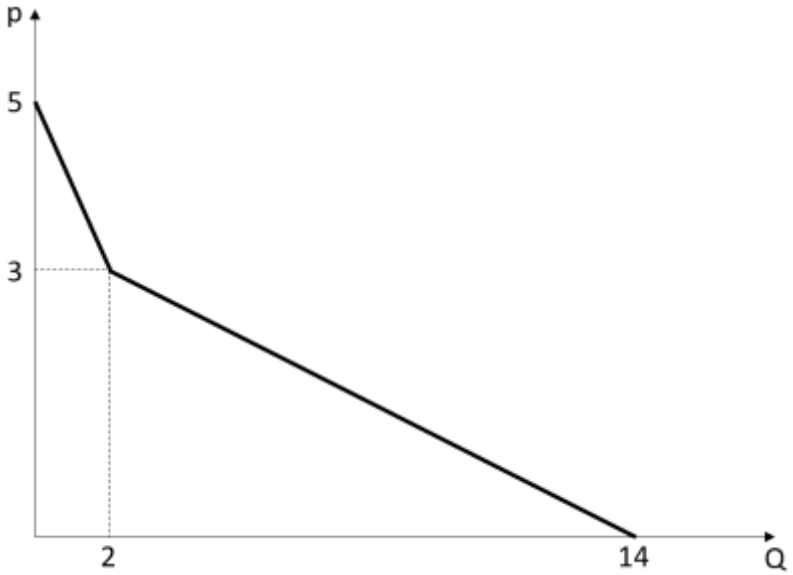
$$q_B = \begin{cases} 6 - 2p & \text{if } p \leq 3 \\ 0 & \text{if } p > 3 \end{cases}$$

Colin has the following demand function:

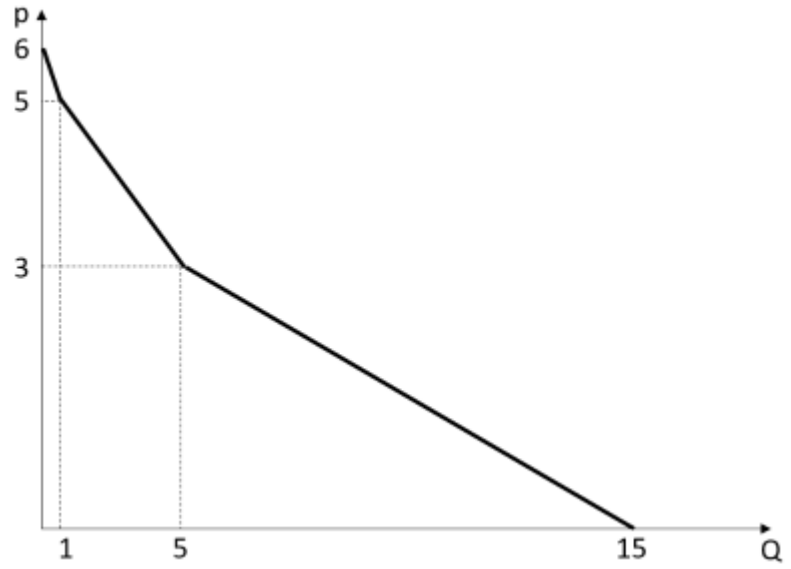
$$q_A = \begin{cases} 5 - p & \text{if } p \leq 5 \\ 0 & \text{if } p > 5 \end{cases}$$

Select the figure that illustrates the *market* demand curve.

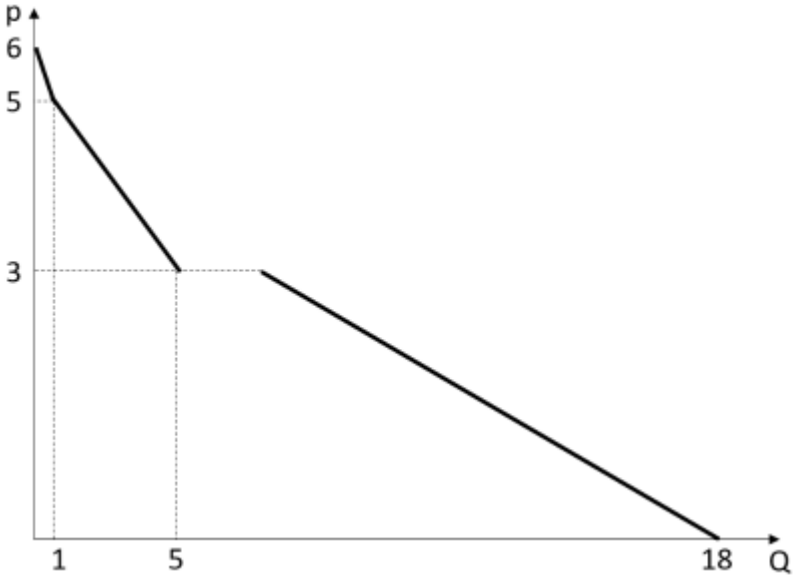
✓A.



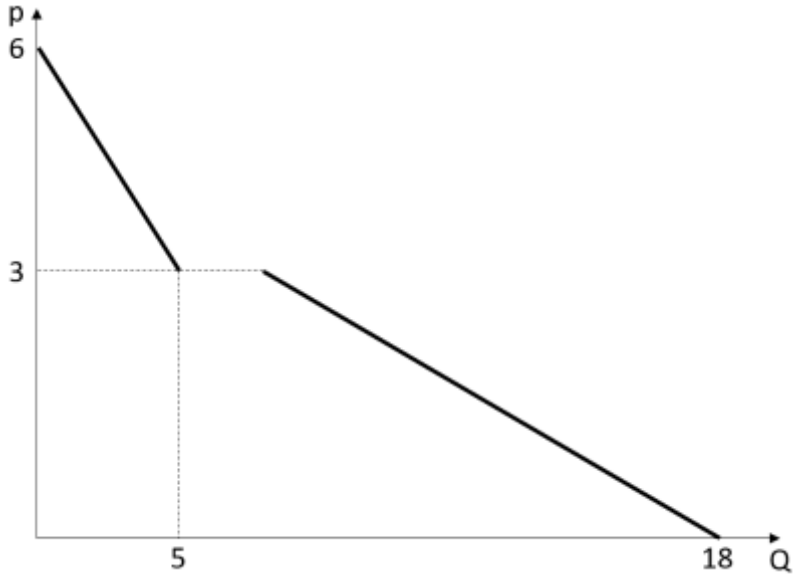
B.



C.



D.



E. None of the figures are correct illustrations of the market demand curve.

A is correct. Above p=3, only Colin is in the market, so the market demand will follow that of Colin in this range. This is a straight line from 5, sloping downwards with a slope of 1. When price hits 3, the other two enter the market. At p=3 itself, Amos and Betty contribute nothing still, while Colin contributes 5-3=2. That is the kink point. Then the graph has a slope of -1/4 until we hit the x-axis, with intercept of 3+6+5=14.

During the circuit breaker period of the Covid-19 pandemic, many households in Singapore turned to baking to earn extra cash. At the same time, possibly because desserts help with the emotional stress of being cooped at home all day, people started eating more baked good products. Holding other factors constant, in the baked good products market, equilibrium:

A. price and quantity both increase.
B. price increases and quantity decreases.
C. price increases, and quantity may increase, decrease, or remain the same.
D. price decreases and quantity increases.
E. price and quantity both decrease.
F. price decreases, and quantity may increase, decrease, or remain the same.
✓G. price may increase, decrease, or remain the same, and quantity increases.
H. price may increase, decrease, or remain the same, and quantity decreases.
I. price and quantity may both increase, decrease, or remain the same.

Both supply and demand shift right. If you draw it out, quantity must increase, but you can draw it such that price goes in any direction.

The Monetary Authority of Singapore recently launched the ESG Impact Hub to to spur Environment, Social, Governance (ESG) collaboration between stakeholders. In response to this, more firms become interested in sustainable finance and want to hire employees skilled in ESG investing and analysis. Suppose educational institutions like NUS are slow in coming up with new courses on ESG. Holding other factors constant, we should expect that in the market for ESG-skilled labor, equilibrium:

✓A. wage and quantity both increase.
B. wage increases and quantity decreases.
C. wage increases, and quantity may increase, decrease, or remain the same.
D. wage decreases and quantity increases.
E. wage and quantity both decrease.
F. wage decreases, and quantity may increase, decrease, or remain the same.
G. wage may increase, decrease, or remain the same, and quantity increases.
H. wage may increase, decrease, or remain the same, and quantity decreases.
I. wage and quantity may both increase, decrease, or remain the same.

Demand for ESG-skilled labor increases, no new courses at educational institutions means the supply of ESG-skilled labor remains constant. So equilibrium price (wage) and quantity increase.

Satellite coverage is a crucial component of the cost of internet, with the marginal cost decreasing when more satellites are in place. Reusable space rockets have the potential to dramatically increase the number of satellites in space. When this happens, holding other factors constant, we should expect that in the market for internet connections:

A. price and quantity both increase.

B. price increases and quantity decreases.

C. price increases, and quantity may increase, decrease, or remain the same.

✓D. price decreases and quantity increases.

E. price and quantity both decrease.

F. price decreases, and quantity may increase, decrease, or remain the same.

G. price may increase, decrease, or remain the same, and quantity increases.

H. price may increase, decrease, or remain the same, and quantity decreases.

I. price and quantity may both increase, decrease, or remain the same.

If the number of satellites increases in space, marginal costs of satellite coverage decreases, which means supply shifts right. Then price will decrease and quantity will increase.

Consider the market for Covid-19 Antigen Rapid Test (ART) kits. Suppose an increase in Covid-19 cases causes households to need more ART kits. At the same time, an improvement in saliva-based Covid-19 Polymerase Chain Reaction (PCR) test technology leads to increased efficiency in the PCR test production process. Also suppose that Covid-19 ART and PCR tests are substitutes. Holding other factors constant, we should expect that in the market for ART kits:

A. price and quantity both increase.
B. price increases and quantity decreases.
C. price increases, and quantity may increase, decrease, or remain the same.
D. price decreases and quantity increases.
E. price and quantity both decrease.
F. price decreases, and quantity may increase, decrease, or remain the same.
G. price may increase, decrease, or remain the same, and quantity increases.
H. price may increase, decrease, or remain the same, and quantity decreases.
✓I. price and quantity may both increase, decrease, or remain the same.

Households need more ART kits which causes demand to shift right. In the PCR test market, an improvement of production efficiency means that supply shifts right, which causes prices to fall. By definition of substitutes, a fall in prices in PCR market means that demand of ART kits fall, i.e. shifts left. So taking the two together, ART demand could rise or fall, and the effect on equilibrium prices and quantity is indeterminate.

Suppose the market for Grab trips is perfectly competitive, and the demand for Grab trips is given by the demand function

$$Q_D = 5 - 2P + 2P_{Gojek} - Fee$$

, where

P_{Gojek}

is the price of a Gojek trip, and

Fee

is a platform fee that is charged for each trip. Select the **false** statement.

A. Based on this demand function, Grab trips and Gojek trips are substitutes.
B. If the platform fee increases, holding other factors constant, the *equilibrium* price of Grab trips (excluding the fee) will decrease.
C. If the platform fee increases, holding other factors constant, the *equilibrium* quantity of Grab trips will decrease.
D. More than one statement are false.
✓E. All statements are true.

A is true since quantity goes up when price of Gojek goes up.

To see why B and C are true, note that the function implies that a change in Fee shifts the demand curve leftwards. If you draw a diagram, you will see that price and quantity both decrease.

If you chose B, it's likely that you thought that this would be a movement along the demand curve. Remember that anything that affects the demand curve other than price shifts the demand curve (and not induces a movement along the demand curve).

In December 2020, every local in Singapore received a $100 voucher that could be used at hotels. When this happens, we expect hotel:

✓A. price and bookings both increase.
B. price increases and bookings decrease.
C. price increases, and bookings may increase, decrease, or remain the same.
D. price decreases and bookings increase.
E. price and bookings both decrease.
F. price decreases, and bookings may increase, decrease, or remain the same.
G. price may increase, decrease, or remain the same, and bookings increase.
H. price may increase, decrease, or remain the same, and bookings decrease.
I. price and bookings may both increase, decrease, or remain the same.

This is shift rightwards of the demand curve.

The table below shows the quantity demanded of pomfrets and groupers (two types of fish) at various pomfret prices. Assume that the demand of either fish is linear in the pomfret price.

Pomfret price in dollars, $P_{pomfret}$	Pomfret quantity demanded at this pomfret price in thousands, $Q_{D,pomfret}$	Grouper quantity demanded at this pomfret price in thousands, $Q_{D,grouper}$
10	37	23.4
20	34	23.8
30	31	24.2
40	28	24.6
50	25	25
60	22	25.4
70	19	25.8
80	16	26.2
90	13	26.6
100	10	27

Select the statement that is **true**.

A. The two fish are complements.

B. When the pomfret price is \$50 per kg, the cross price elasticity of demand $e_{Q_{D,grouper}P_{pomfret}}$ is -0.08.

✓C. If the grouper price increases, holding other factors constant, the *equilibrium* pomfret price will increase and the *equilibrium* pomfret quantity will increase.

D. The equilibrium price in the pomfret market is \$50 per kg.

E. More than one statement are true.

F. All statements are false.

A is false. When pomfret price increases, grouper quantity goes up, which fits the definition of a substitute.

Then B must be false; the cross-price elasticity for substitutes should be positive.

C is true based on the definition taught in class. If the two fish are substitutes, then when the price of groupers goes up, the quantity demanded of pomfrets should go up. This is a shift of the pomfret demand curve (since it's not the price of pomfrets that changed). So both equilibrium price and quantity will go up.

D is wrong because you need information on pomfret supply in order to determine the market equilibrium. We do not have that.

Suppose the daily demand and supply for eggs at various prices are linear, and given as follows:

Price ($)	Demand (thousand boxes)	Supply (thousand boxes)
2	68	5
3	62	20
4	56	35
5	50	50
6	44	65
7	38	80
8	32	95
9	26	110
10	20	125

At the market equilibrium, the price elasticity of demand is __1__ and the price elasticity of supply is __2__. (Round to at least 2 decimal places.)

1. Range - Min:-0.61 Max:-0.59
2. Range - Min:1.49 Max:1.51

Using the first two rows, dQd/dP = -6 and dQs/dP = 15. Equilibrium is at p=5, Q = 50. Ed = -6*5/50 = -0.6. Es = 15*5/50 = 1.5.

As we increase the quantity along a *linear demand curve*, the absolute value of the demand elasticity _____.
(Exclude perfectly elastic and perfectly inelastic demand curves for this question.)

A. increases
✓B. decreases
C. remains constant
D. may increase, decrease, or remain constant.

At the price intercept, q=0, so elasticity is -inf. Going rightwards, elasticity has to drop in absolute value since q increases and p decreases. Eventually, at the quantity intercept, p=0, so elasticity is zero.

Suppose the market demand for Pepsi Cola is given by

$$Q_D = 10000 - 2000P + I$$

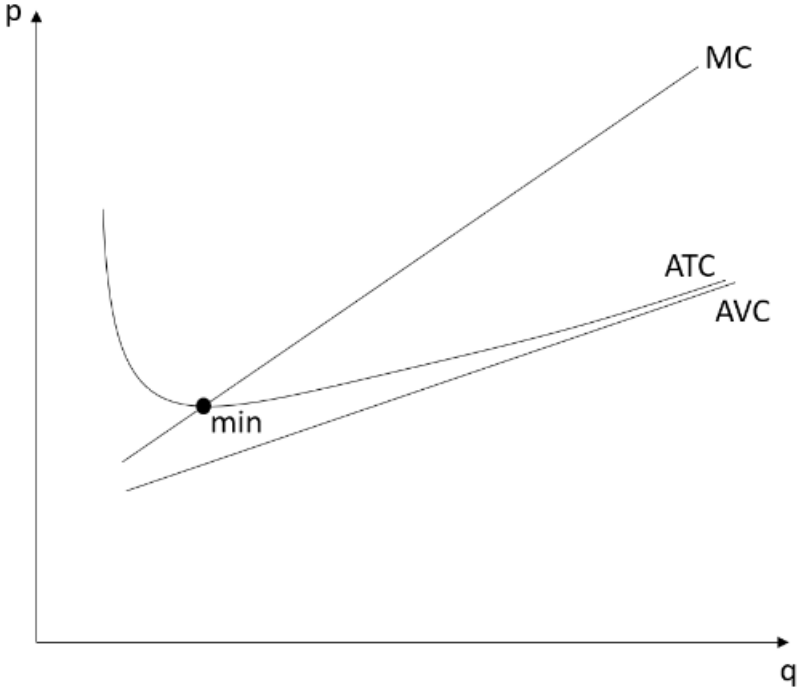
P is the price for Pepsi Cola, and I is income level. When P=2.5 and I=4000, Pepsi Cola's own price elasticity of demand is ____, Pepsi Cola's income elasticity of demand is ____.
Hint: Answers should round to 2 decimal places, and please indicate "-" in front of a negative number.

Pepsi cola's own price elasticity of demand is -0.56, Pepsi cola's income elasticity of demand is 0.44.
Note that when $P = 2.5$ and $I = 4000$, $Q_D = 10000 - 2000P + I = 9000$.

$$e_D = \frac{P}{Q_D}\frac{dQ_D}{dP} = \frac{2.5}{9000} \times (-2000) \approx -0.56$$

$$e_I = \frac{I}{Q_D}\frac{dQ_D}{dI} = \frac{4000}{9000} \times 1 \approx 0.44$$

This graph illustrates a **valid** set of cost curves.



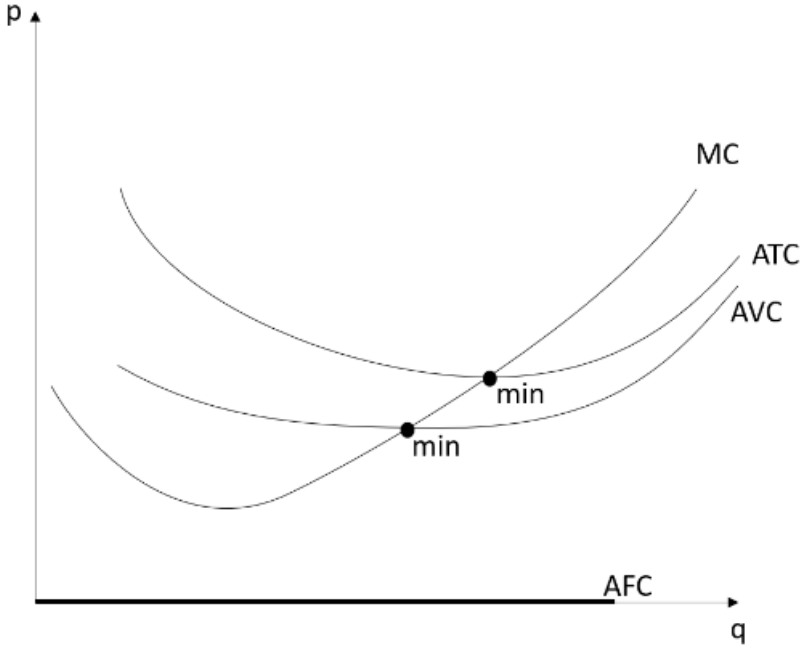
✓A. True

B. False

This set of cost curves fits the characteristics that we talked about, except that MC and AVC do not decrease at first. Recall that the MC curve can decrease at the beginning because of specialization and other economies of scale factors. The linear MC curve just means that these are not present, at least for the region of the graph shown. That's entirely possible, so it's valid. Same for the AVC.

In fact, this is the cost curve for a quadratic total cost function, which you have seen in a few exercises (and is on one of the test questions below).

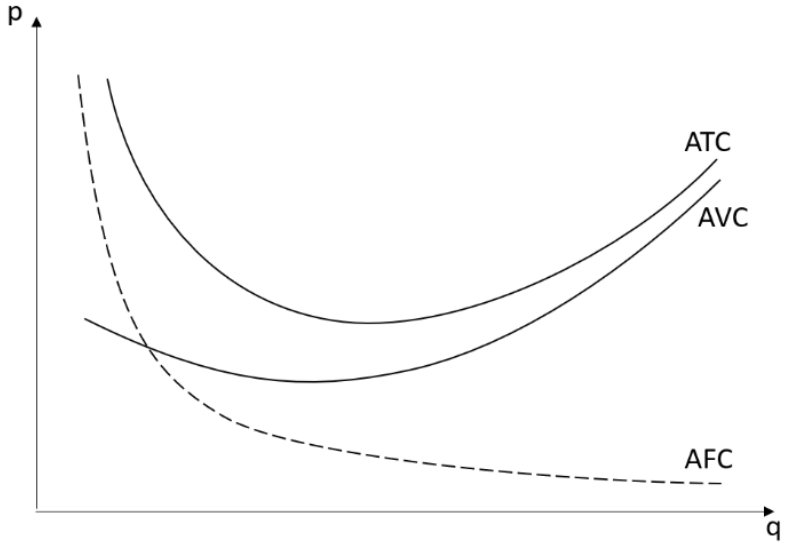
This graph illustrates a **valid** set of cost curves.



A. True
✓B. False

AFC is zero everywhere, which means that FC must be zero. Which means that ATC should be the same as AVC.

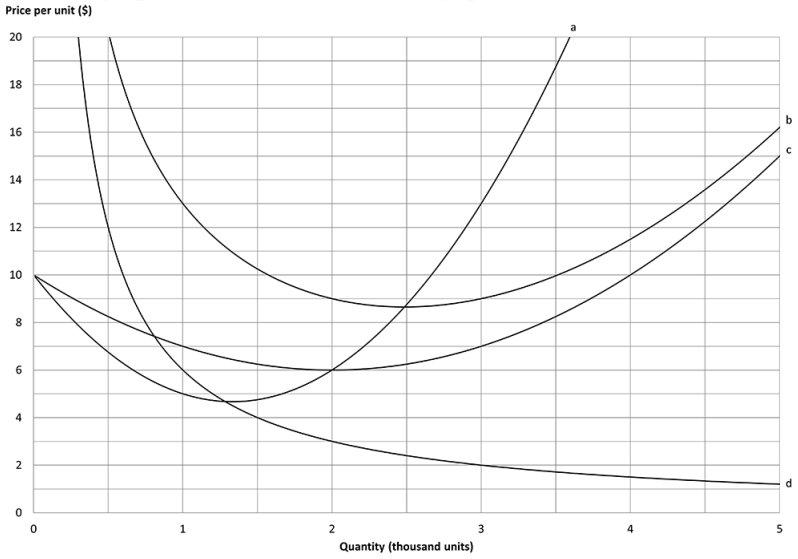
True/false: This graph illustrates a valid set of cost curves.



✓A. True
B. False

All the characteristics of cost curves in lecture are met (e.g. ATC tends towards AVC), AFC strictly decreasing.

This is question 1 of a four-part question.
You graduate from the NUS BBA (Accountancy) Programme and join a big four firm. Your colleague in the consulting services division asks for your help in a case that they are working on.
The client is selling clothing in a perfectly competitive market. They have provided the following graph that illustrates their cost structure for a particular type of t-shirt in the short run, and wants help with their sales strategy.
Use the graph to answer the following question(s).

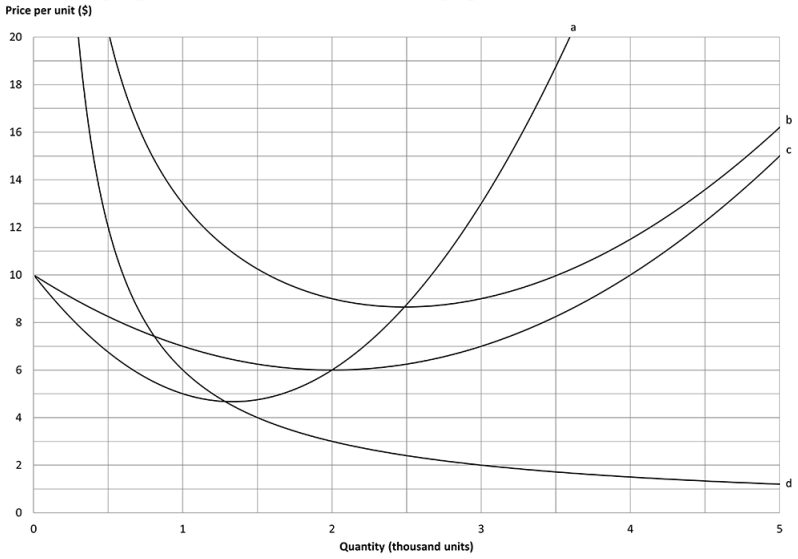


The client has forgotten to label the a, b, c, and d lines on their graph. Respectively, these are the _____ curves.

A. MC, ATC, AFC, and AVC
✓B. MC, ATC, AVC, and AFC
C. AVC, MC, ATC, and AFC
D. MC, AFC, AVC, and ATC
E. None of the options are correct.

Just match with the curves from lecture.

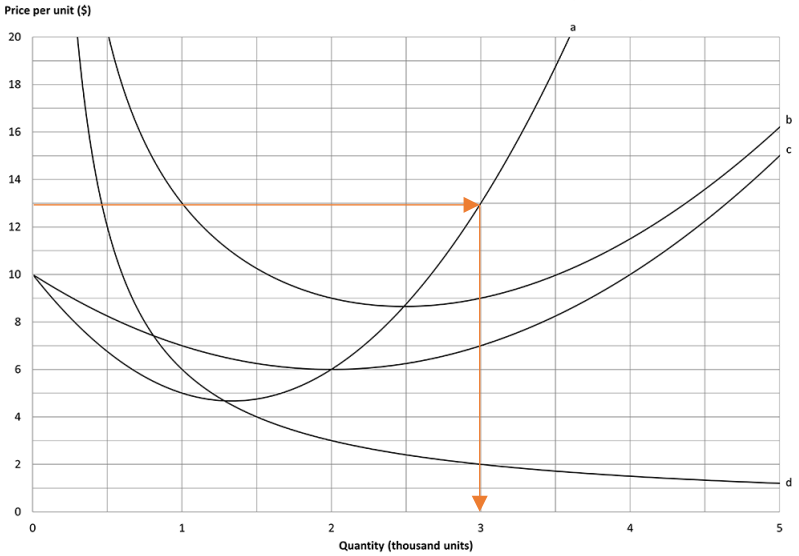
This is question 2 of a four-part question. Be sure to retain your working and final answer(s) for the next question.
You graduate from the NUS BBA (Accountancy) Programme and join a big four firm. Your colleague in the consulting services division asks for your help in a case that they are working on.
The client is selling clothing in a perfectly competitive market. They have provided the following graph that illustrates their cost structure for a particular type of t-shirt in the short run, and wants help with their sales strategy.
Use the graph to answer the following question(s).



Fill in the blank, and select the correct multiple-choice option.
Your market research reveals that the short-run equilibrium price for this type of t-shirt is $13 per unit.
You client should produce __1__ thousand units of the t-shirt if it chooses not to shut down. (Round to at least 1 decimal place.) Given the price, your client __2__ *shut down*.

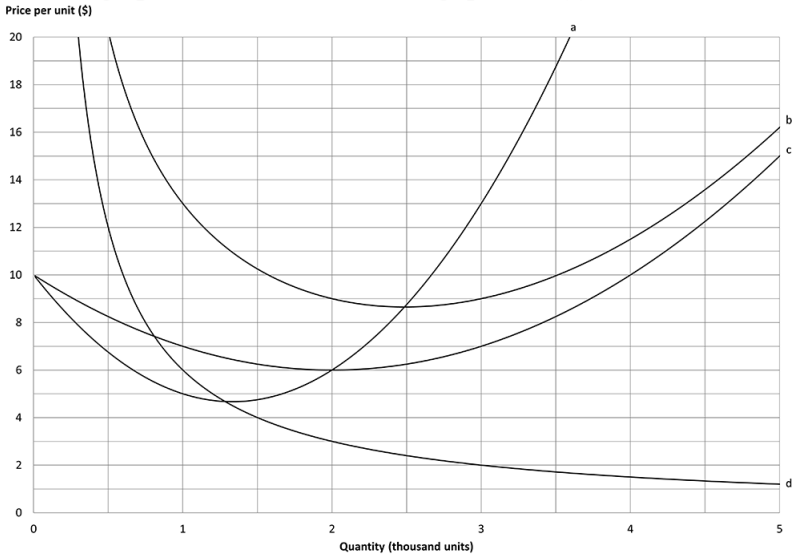
1. Range - Min:2.9 Max:3.1
2. Choice of: should | should not | should be indifferent about - Correct Answer:should not

Trace out the line from $13 to the MC curve (line a), and read off the x-axis value.



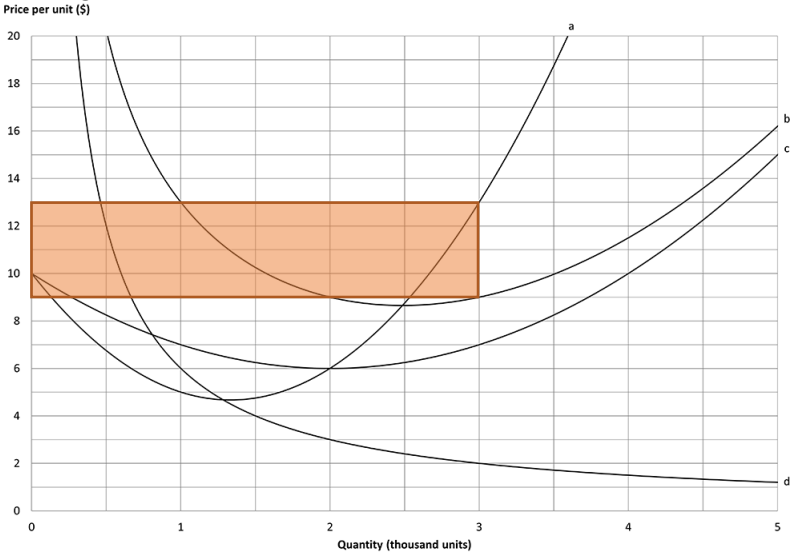
At this quantity, the AVC (line c) is $7. So p=$13>$7=AVC. So do not shut down.

This is question 3 of a four-part question. Be sure to retain your working and final answer(s) for the next question.
You graduate from the NUS BBA (Accountancy) Programme and join a big four firm. Your colleague in the consulting services division asks for your help in a case that they are working on.
The client is selling clothing in a perfectly competitive market. They have provided the following graph that illustrates their cost structure for a particular type of t-shirt in the short run, and wants help with their sales strategy.
Use the graph to answer the following question(s).



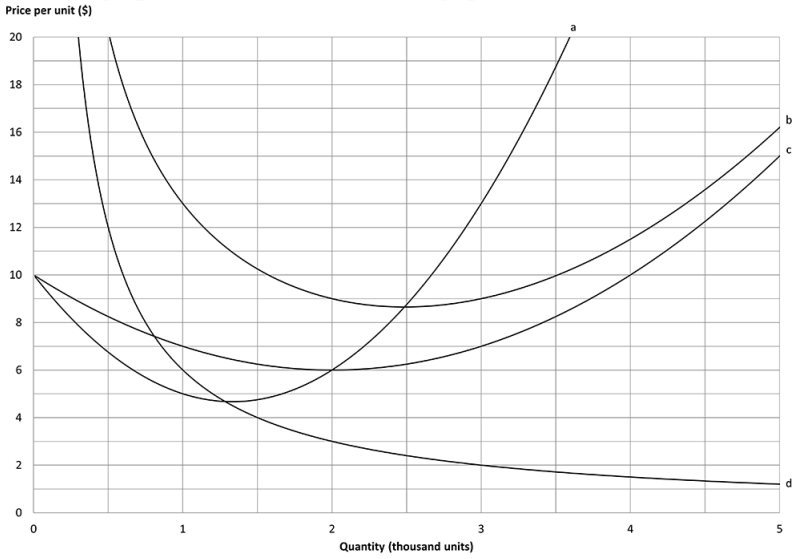
Fill in the blank.
Your market research reveals that the short-run equilibrium price for this type of t-shirt is $13 per unit. At this price, your client will make __1__ thousand dollars in profit. (Round to at least 1 decimal place).

1. Range - Min:11.9 Max:12.1



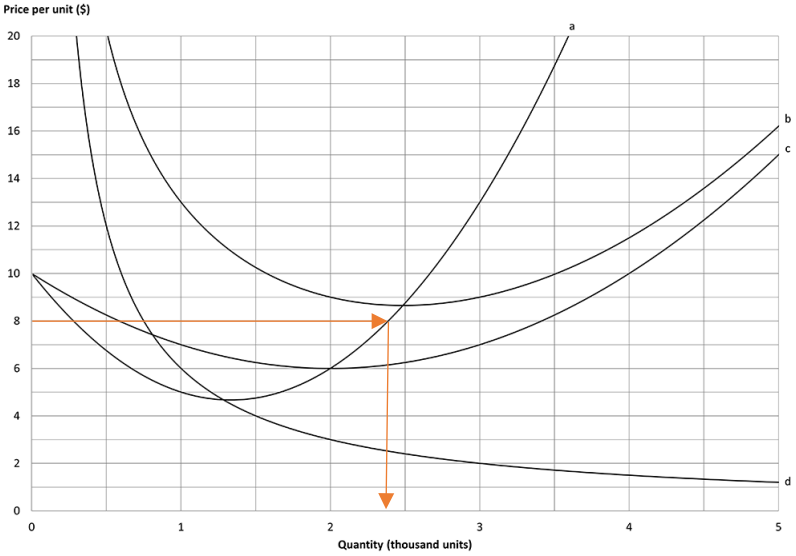
Profit is the area of the box above. This is (13-9)*3 = 12.

This is question 4 of a four-part question.
You graduate from the NUS BBA (Accountancy) Programme and join a big four firm. Your colleague in the consulting services division asks for your help in a case that they are working on.
The client is selling clothing in a perfectly competitive market. They have provided the following graph that illustrates their cost structure for a particular type of t-shirt in the short run, and wants help with their sales strategy.
Use the graph to answer the following question(s).



Select the correct multiple-choice options.
Now suppose a recession hits. Your market research reveals that the short-run equilibrium price for this type of t-shirt has dropped to $8 per unit. The client reveals that the cost structure has not changed.
At this price, your client __1__ *shut down*, and it will make __2__ profit.

1. Choice of: should | should not | should be indifferent about - Correct Answer:should not
2. Choice of: positive | negative | zero - Correct Answer:negative



At this price, the firm should produce something like 2.4 thousand units. The important thing is that MC(2.4)=8 is still larger than AVC(2.4), which is around 6.1. So do not shut down.
For profit, now that MC(2.4)=8=p is smaller than ATC(2.4), which is around 8.7, the firm will be making

negative profits.

This is question 1 of a two-part question. Be sure to retain your working for the next question.
Suppose we have 3 types of firms in a perfectly competitive market. There are 100 firms of type 1, each with supply function

$$q_1(p) = \begin{cases} p & \text{if } p \geq 3 \\ 0 & \text{if } p < 3 \end{cases}$$

.
There are 100 firms of type 2, each with supply function

$$q_2(p) = \begin{cases} p+3 & \text{if } p \geq 3 \\ 0 & \text{if } p < 3 \end{cases}$$

.
There are 100 firms of type 3, each with supply function

$$q_3(p) = \begin{cases} p+5 & \text{if } p \geq 2 \\ 0 & \text{if } p < 2 \end{cases}$$

.
Suppose that we are in the short run.
Select the **false** statement.

A. All three types of firms will shut down at a price of 1.
B. The minimum ATC for type-3 firms must be 2.
C. When the price is 10, all three types of firms must be earning a positive profit since they are choosing to supply positive quantities at that price.
D. All three types of firms will supply positive quantities at a price of 4.
✓E. More than one statement are false.
F. All statements are true.

B and C are both false.
For B, in general, ATC has nothing to do with the firm's choice of how much to supply in the short run. That is determined by factors associated with variable costs (MC and AVC), not total costs.
In fact, if the question had said "minimum AVC for type-3 firms must be 2" instead of "minimum ATC", the

answer would have been true (with a caveat). In the short run, since type-3 firms are not supplying below a price of 2, they must be shutting down at that price. Next, we know that the firm operates if price is more than AVC, so the AVC must be 2. The caveat needed in the question is to handle an inconsistency between the shutdown condition (operate if p>AVC) and the question (supply if p>=2).

For C, firms could be incurring a lot of fixed cost, which could turn profits negative.

This is question 2 of a two-part question.
Suppose we have 3 types of firms in a perfectly competitive market. There are 100 firms of type 1, each with supply function

$$q_1(p) = \begin{cases} p & \text{if } p \geq 3 \\ 0 & \text{if } p < 3 \end{cases}$$

.
There are 100 firms of type 2, each with supply function

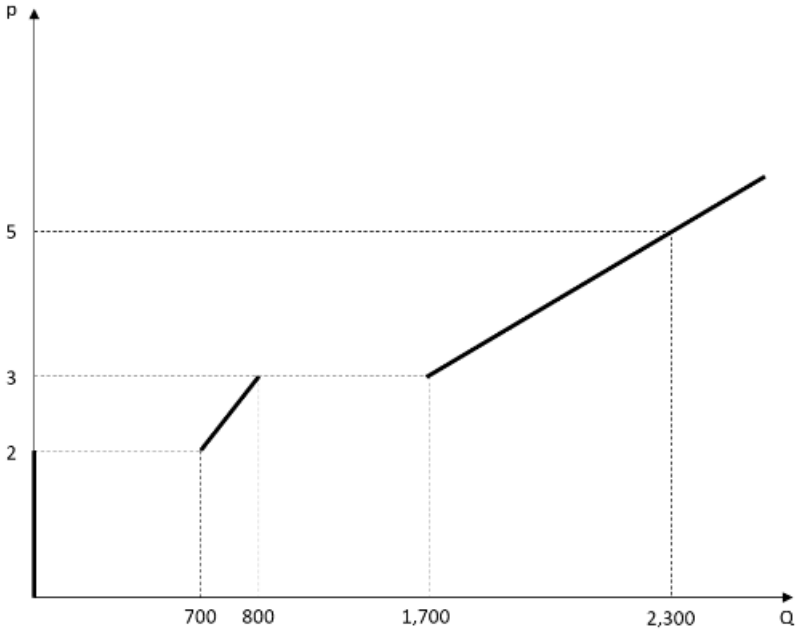
$$q_2(p) = \begin{cases} p+3 & \text{if } p \geq 3 \\ 0 & \text{if } p < 3 \end{cases}$$

.
There are 100 firms of type 3, each with supply function

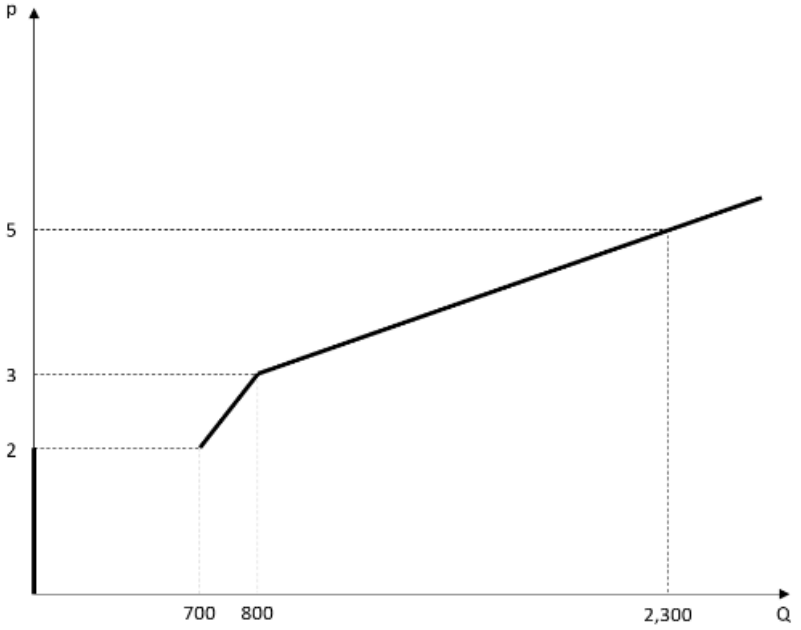
$$q_3(p) = \begin{cases} p+5 & \text{if } p \geq 2 \\ 0 & \text{if } p < 2 \end{cases}$$

.
Suppose that we are in the short run.
Select the figure that illustrates the *market* supply curve.

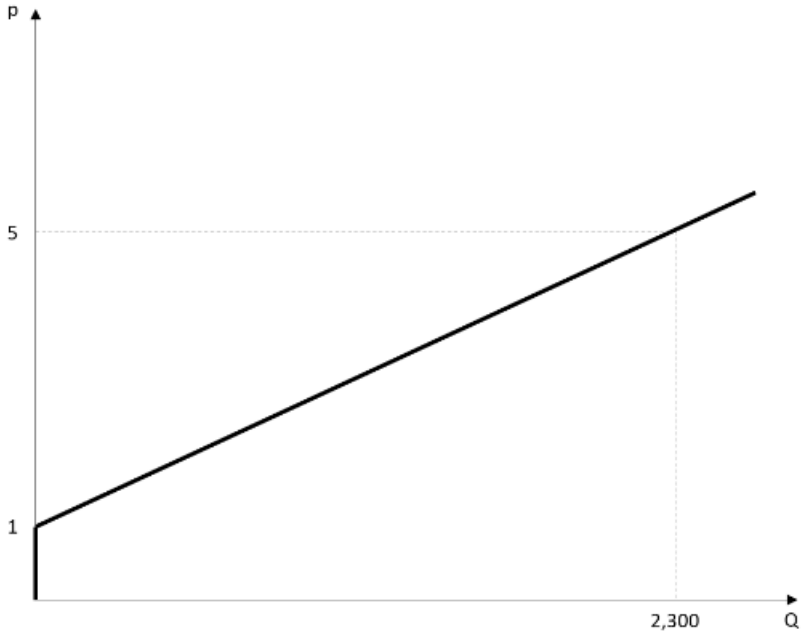
✓A.



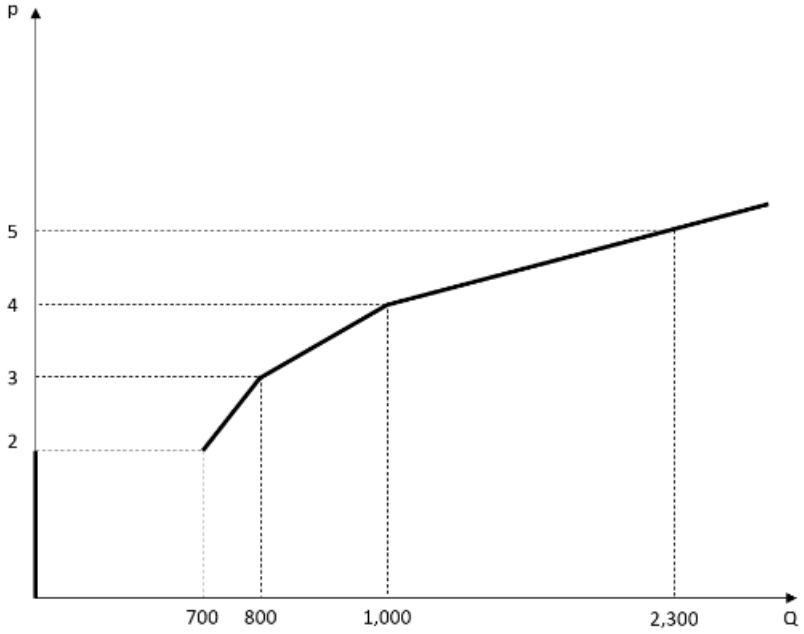
B.



C.



D.



E. None of the graphs are correct.

This is the same figure as in the lecture slides! Except with linear curves, and different quantity values.

If you are confused about the jump from quantity of 800 to 1700, this happens because firm types 1 and 2 enter the market at this point. At a price of 3, they contribute 3*100 + (3+3)*100=900 units, so there must be a jump of size 900.

This is part 1 of a three-parts question. Be sure to retain your working for the next question.
A firm has total cost function

$$TC(q) = 12 + q^2$$

Select the **true** statement.

A. The firm's ATC achieves its minimum point when q = 5.
B. The firm's marginal cost is U-shaped.
✓C. The firm must be operating in the short run.
D. If the firm produces 10 units, its average variable cost will be 100.
E. More than one substantive statement are true.
F. All substantive statements are false.

A is false. It's not too hard to use the quadratic formula for this, but an easier way would be to use MC=minATC. MC=2q, ATC=12/q+q, equate the two and you have 12/q=q, or q^2=12, which means that q is not equal to 5.
B is false, MC=2q is linear, which means it cannot be U-shaped.
C is true, since the TC has a fixed cost. This fixed cost must come from a fixed input, and so we must be in the short run.
D is false. AVC(q) = q, which means AVC(10)=10.

This is part 2 of a three-parts question. Be sure to retain your working and answer for the next question.
A firm has total cost function

$$TC(q) = 12 + q^2$$

Regardless of your answer to the previous question, assume that the firm is operating in the short run.
True/false: The firm's short run supply function is

$$q = 0.5p$$

for all price above zero. (Be sure to check the shut-down condition as well.)

✓A. True
B. False

This is true. The profit maximizing condition is p=2q. Since p=2q>q=AVC for all q, the shut-down condition is never satisfied (the firm always operates). Then inverting the profit maximizing condition, we have q=0.5p.

This is part 3 of a three-parts question.
A firm has total cost function

$$TC(q) = 12 + q^2$$

Suppose this is the short run, and there are 99 other firms that are identical to this firm (for a total of 100 firms). In the market that these firms are operating in, the demand curve is given by

$$Q_D = 220 - 5p$$

Select the **true** statement.

A. In the short run, each firm makes a loss of 8 (i.e. a profit of -8).
B. As we transition from the short run to the long run, we expect some firms to leave the market.
C. As we transition from the short run to the long run, we expect price to rise.
✓D. More than one substantive statement are true.
E. All substantive statements are false.

A is true. Q_S=100q=100*0.5p = 50p. Equating Q_S and Q_D, we have 220-5p=50p, or p=4. At this price, q=0.5*4=2. So total revenue is 2*4=8, and total cost = 12+2^2=16. This gives profit = 8-16 = -8.
B is true. With negative profits, some firms will leave the market in the long run.
C is true. As firms leave the market, the supply curve shifts left, and prices rise.

This is question 1 of a three-part question. Be sure to retain your working for the next question.
A firm has total cost function

$$TC(q) = 4 + 2q + \frac{1}{2}q^2$$

. It is operating in the short run. Select the **false** statement.

A. The fixed cost associated with this TC function is 4.
B. Its marginal cost of production is given by

$$MC(q) = 2 + q$$

.
✓C. If it produces 100 units, its *average variable cost* will be 50.
D. If it produces 100 units, its *average fixed cost* will be 0.04.
E. More than one statement are false.
F. All statements are true.

A is true, 4 is the constant in TC.
B is true, differentiate to get this.
C is false, AVC = 2 + 0.5*q and at 100 this is 52.
D is true, AFC = 4/q and at 100 this is 0.04.

This is question 2 of a three-part question. Be sure to retain your working and final answer(s) for the next question.
A firm has total cost function

$$TC(q) = 4 + 2q + \frac{1}{2}q^2$$

. It is operating in the short run.
True/false: ignoring the shutdown condition, the firm's short-run supply function is

$$q_s = \begin{cases} p - 2 & \text{if } p \geq 2 \\ 0 & \text{if } 0 \leq p < 2 \end{cases}$$

.

✓A. True
B. False

From PMC, p=MC. So p = 2+q.
Invert to get q = p-2.
When q=0, we have p=2. So if p<2, set q to 0, and if p>2, set it to p-2. The equality can be placed on either top or bottom branch since they both evaluate to the same number (zero).

This is question 3 of a three-part question.
A firm has total cost function

$$TC(q) = 4 + 2q + \frac{1}{2}q^2$$

. It is operating in the short run.
True/false: the short-run shut-down condition is never satisfied (i.e. the operating condition is always satisfied).

✓A. True
B. False

p>=AVC
From PMC, p=MC. So 2+q>=2+0.5*q.
Always true.

This is part 1 of a three-parts question. It might be useful to retain your working and final answer for the next question.
A firm operating in the short run has total cost function

$$TC(q) = 25 + 3q + 5q^2$$

.
Select the **false** statement.

✓A. If the firm produces 20 units, its fixed cost will be 20.
B. The firm's average total cost is never less than 23.
C. Based on this cost function, the firm experiences diminishing marginal returns at some quantities.
D. If the firm produces 5 units, its average variable cost will be 28.
E. More than one substantive statement are false.
F. All substantive statements are true.

A is false. FC is 25 based on this function.
B is true. ATC = 25/q + 3 + 5q. MC = 3 + 10q. Next, use the MC cuts the ATC at its minimum point property. Equate the two to get 25/q + 3 + 5q = 3 + 10q. Solve to find that the ATC's minimum point is at q=sqrt(5). Substitute this back into the ATC formula, and you find that the minimum ATC is around 25.36067. Hence ATC > 25.3606, which implies that ATC≥23, i.e. it is never less than 23.
C is true. DMR is associated with the increasing part of the MC from the notes, and MC = 3 + 10q is an increasing function in q.
D is true. AVC = 3 + 5q. Substitute in q=5 to get 3+5*5=28.

This is part 2 of a three-parts question. It might be useful to retain your working and final answer for the next question.
A firm operating in the short run has total cost function

$$TC(q) = 25 + 3q + 5q^2$$

.
True/false: The firm's short run supply function is

$$q = \begin{cases} 10p + 3 & \text{if } p \geq 0.3 \\ 0 & \text{if } p < 0.3 \end{cases}$$

for all prices above zero. (Be sure to check the shut-down condition as well.)

A. True
✓B. False

From the profit maximizing condition, p= MC = 3 + 10q. Make q the subject to get q = 0.1p – 0.3.
Compare with the upper branch and it's obviously false.

This is part 3 of a three-parts question.
A firm operating in the short run has total cost function

$$TC(q) = 25 + 3q + 5q^2$$

.
Suppose there are 99 other firms that are identical to this firm (for a total of 100 firms). In the perfectly competitive market that these firms are operating in, the demand curve is given by

$$Q_D = 300 - 5p$$

.
Select the **false** statement.

✓A. In the short run, each firm makes a loss of 8 (i.e. a profit of -8).
B. As we transition from the short run to the long run, we expect the total number of firms to decrease.
C. As we transition from the short run to the long run, we expect price to rise.
D. More than one substantive statement are false.
E. All substantive statements are true.

A is false. Individual firm supply is q = 0.1p – 0.3. Market supply is Q_S = 100q = 10p – 30. Q_D = Q_S occurs at p=22, which implies equilibrium market quantity is 190. Since there are 100 identical firms, each firm must be making 1.9 units. Profit is then 1.9*22 – (25 + 3*1.9 + 5*1.9^2) = -6.95, so not -8.
B is true. Profits is negative, some firms will exit, so number of firms decrease.
C is true, as firms exit, supply decreases, price increases.

Select the **false** statement.

✓A. In the long run, profits can be negative or zero, but can never be positive.

B. The short-run ATC decreases at first mainly because of fixed costs, while the long-run ATC decreases at first entirely because of economies of scale.

C. In the long run, the optimal choice is such that p=ATC.

D. In the long run, firms operate at the minimum point of their ATC curves.

E. Two or more statements are false.

F. All statements are true.

A is false because profits cannot be negative in the LR as well.

B is true. There are no fixed costs in the LR.

C is true, it's almost exactly the same thing as what is in the slides. (Remember ATC = AC in the LR.)

D is true, again it's almost exactly the same as what is in the slides.

A firm is one of many identical firms operating in the **long run** competitive equilibrium. The following schedule shows its total cost as a function of output. Assume that the firm's average cost curve decreases and then increases as quantity increases.

Output q (in thousands)	Total cost (in thousand dollars)
1	6
2	11
3	15
4	18
5	20

Select the **true** statement.

A. The firm experiences diseconomies of scale within the range of 1001 to 4999 units.
✓B. In the long run competitive equilibrium, the firm will produce at least 5000 units.
C. In the long run competitive equilibrium, the price of the firm's products will be greater than 4 dollars per unit.
D. When the firm produces 3000 units, its marginal cost must be at least 5 dollars.
E. More than one substantive statement are true.
F. All substantive statements are false.

Calculate the average cost.

Output q (in thousands)	LRAC (in dollars)
1	6
2	5.5
3	5
4	4.5
5	4

A is false, between 1000 and 4999 the AC is decreasing, which is the economies of scale region.
B is true. We know that firms minimize their LRAC in the LR. Since the AC curve decreases and increases, and we know the economies of scale region is at $1000<q<5000$, this LRAC minimum point must occur at $q\geq 5000$.
C is false. In the LR p=LRAC, and by the above we know that the LRAC minimum point must occur at $q\geq 5000$, which means that the price must be at most 4.
D is false. The AC curve is decreasing at q=3000. By the average-marginal rule, MC must be below AC, so at this q, MC must be less than 5.

A firm is one of many identical firms operating in the **long run** competitive equilibrium. The following schedule shows its total cost as a function of output. Assume that the firm's average cost curve is U-shaped.

Output q (in thousands)	Total cost (in thousand dollars)
1	6
2	14
3	24
4	36

Select the **false** statement.

A. The firm experiences diseconomies of scale within the range of 1001 to 3999 units.
B. In the long run competitive equilibrium, the firm will produce at most 1000 units.
C. In the long run competitive equilibrium, the price of the firm's products will be at most 6 dollars per unit.
D. When the firm produces 2000 units, its marginal cost must be more than 7 dollars.
E. More than one substantive statement are false.
✓F. All substantive statements are true.

A is true. Work out the AC values, and you should get 6, 7, 8, 9 (in order). This is increasing, which means that the firm is in the diseconomies of scale region of the curve between 1000 and 4000 (excluding end points, just because it could be efficient scale at 1000).
B and C are true. In the LR, the firm operates at the efficient scale point, which occurs before the diseconomies of scale region. The price will then be 6 or less.
D is true. Since the AC curve is increasing at 2000, that means that the MC must be above the AC.

Select the **true** statement.

A. If a firm is making a loss (negative profits) in the short run, it should shut down.
B. Suppose firm 1 and firm 2's variable cost functions are the same, but firm 1 has fixed cost of 100 while firm 2 has fixed cost of 1000. Then, firm 1's supply curve will be identical to firm 2's supply curve.
C. Without fixed costs, the ATC, AVC, and MC curves will all be equal to one another.
D. If MC is above the ATC at a particular q, the ATC must be upwards sloping at that q.
✓E. More than one substantive statements are true.
F. All substantive statements are false.

A is false, the shut down condition allows negative profits still.
B is true. The supply curve does not depend on fixed cost at all in the short run (and we are in the short run since we have fixed cost).
C is false. ATC and AVC will be equal, but the MC will not.
D is true. This is the average-marginal relationship.

This is question 1 of a two-part question. Be sure to retain your working and final answer(s) for the next question. The table below shows the demand and supply schedules in a particular market.

Price per unit (dollars)	Quantity demanded at this price (millions)	Quantity supplied at this price (millions)
1	18	0
2	16	1
3	14	2
4	12	3
5	10	4
6	8	5
7	6	6
8	4	7
9	2	8
10	0	9

Fill in the blank: the equilibrium price is __1__ dollars per unit, and the equilibrium quantity is __2__ million units. (Round to at least 2 decimal places.)

1. Range - Min:6.9 Max:7.1
2. Range - Min:5.9 Max:6.1

Equilibrium means Qd=Qs, look for the row that the numbers are the same and read off from there.

This is question 2 of a two-part question.
The table below shows the demand and supply schedules in a particular market.

Price per unit (dollars)	Quantity demanded at this price (millions)	Quantity supplied at this price (millions)
1	18	0
2	16	1
3	14	2
4	12	3
5	10	4
6	8	5
7	6	6
8	4	7
9	2	8
10	0	9

Assume that the demand and supply curves are linear. Suppose the government imposed a price ceiling of 5 dollars per unit.
Fill in the blanks: __1__ million units will be transacted in the market, and the deadweight loss associated with the price ceiling is __2__ million dollars. (Round to at least 2 decimal places.)

1. Range - Min:3.9 Max:4.1
2. Range - Min:2.9 Max:3.1

For this question, it is useful to draw a diagram.
From the previous question, the market equilibrium is at p=7, q=6.
The price ceiling of 5 will restrict quantity to 4 because that's what sellers are willing to supply at this price.
At quantity of 4, the willingness to pay of buyers is 8.
So the DWL is represented by the triangle with edges (6,7), (4,8), (4,5) (in q,p format). The area of this triangle is 0.5*(8-5)*(6-4)=3.

This is part 1 of a three-parts question. It may be helpful to retain your working for the next question.
In a city with a small sized population, the equilibrium price for a city bus ticket is $2.00, and the equilibrium number of riders each day is 50,000. At the market equilibrium point, the demand elasticity is -1, and the supply elasticity is 1. Suppose the market demand is linear such that

$$Q_D = a - bP$$

(a, b are nonnegative coefficients) and the market supply is also linear such that

$$Q_S = c + dP$$

(c, d are nonnegative coefficients).
Find the coefficients and fill in the blanks. a:____, b:____, c:____, d:____.
Hint: Note that all answers should be integers.

a = 100000, b = 25000, c = 0, d = 25000
Note that $\frac{dQ_D}{dP} = -b$ and $\frac{dQ_S}{dP} = d$. From $-1 = e_D = \frac{P}{Q_D}\frac{dQ_D}{dP} = -\frac{2}{50000}b$, we have b = 25000.
So $a = Q_D + bP = 50000 + 25000 \times 2 = 100000$. From $1 = e_S = \frac{P}{Q_S}\frac{dQ_S}{dP} = \frac{2}{50000}d$, we have d = 25000. So $c = Q_S - dP = 50000 - 25000 \times 2 = 0$.

This is part 2 of a three-parts question. Regardless of whether you got the previous part correct, you can still do this question! Be sure to retain your working and answer for the next question.
In a city with a small sized population, the equilibrium price for a city bus ticket is $2.00, and the equilibrium number of riders each day is 50,000. At the market equilibrium point, the demand elasticity is -1, and the supply elasticity is 1. Suppose the market demand is linear such that

$$Q_D = 100{,}000 - 25{,}000P$$

and the market supply is also linear such that

$$Q_S = 25{,}000P$$

Suppose an increase in the world oil price causes the demand for bus tickets to increase by 20%.
Fill in the blank. The new equilibrium price of a bus ticket would be ____ dollars.
Hint: Demand for bus ticket increases by 20% means for any given price, quantity demanded increases to 1.2 times of the previous quantity demanded. Answer should round to 2 decimal places.

new equilibrium price is 2.18

Method 1: we first find the inverse demand function $P = 4 - \frac{1}{25000}Q_D$. Let us denote the new quantity demanded as Q_D', then based on the question, we have $Q_D' = 1.2Q_D$ or $Q_D = \frac{1}{1.2}Q_D'$. Substitute Q_D by $\frac{1}{1.2}Q_D'$ into the inverse demand function, we have $P = 4 - \frac{1}{30000}Q_D'$ which is our new inverse demand function after demand increase by 20%. Combining the new inverse demand and the original supply, we get new equilibrium price is approximately 2.18.

Method 2: since demand increases by 1.2 at any price level, you can pick any two points on the original demand function, let us pick the two intersection points (Q_1, P_1) = (0, 4) and (Q_2, P_2) = (100000, 0), and then the corresponding points (Q_1', P_1') = (1.2×0, 4) = (0,4) and (Q_2, P_2) = (100000× 1.2, 0) = (120000, 0) must on the new demand curve. With these two points, you can pin down the function for the new demand. Again, combine the new demand function and the original supply function, you can get the new equilibrium price.

If you thought the price would be 2.4, you might have been imagining a parallel shift outwards of the demand curve, with the demand curve moving away from the origin by 20%. This is wrong because it contradicts "increases by 20%" – from the hint, increasing by 20% means that every single point is shift right by 20%. This is a shift that comes together with a change in slope.

This is part 3 of a three-parts question.
In a city with a small sized population, the equilibrium price for a city bus ticket is $2.00, and the equilibrium number of riders each day is 50,000. At the market equilibrium point, the demand elasticity is -1, and the supply elasticity is 1. Suppose the market demand is linear such that

$$Q_D = 100{,}000 - 25{,}000P$$

and the market supply is also linear such that

$$Q_S = 25{,}000P$$

Suppose an increase in the world oil price causes the demand for bus tickets to increase by 20%.
Fill in the blank. If the city council refuses to let the bus company raise the price of bus tickets (so the price is still $2.00), what daily shortage of tickets would be created? Ans: ____
Hint: Integer answer.

shortage is 10000

Given the original price, the new demand now becomes $50000 \times 1.2 = 60000$, while the supply is at the original level of 50000. So excess demand is 10000.

This is part 1 of a three-parts question. Be sure to retain your working and answers for the next two questions.

Assume the market for durian is perfectly competitive. Suppose market demand is given by

$$Q_D = 50 - 2P$$

and market supply is given by

$$Q_S = 3P$$

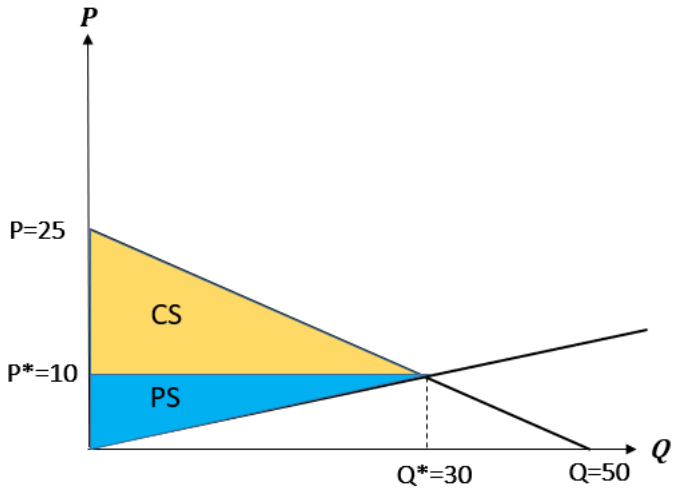
Fill in the blanks. At the competitive market equilibrium, total consumer surplus is ____, total producer surplus is ____, and total market surplus is ____.

Hint: The inverse demand function is given by

$$P = 25 - \frac{1}{2}Q$$

CS = 225, PS = 150, TS = 375

Refer to the following graph:



CS is represented by the yellow triangle area and is calculated as $CS = \frac{1}{2} \times 30 \times (25 - 10) = 225$. PS is represented by the blue triangle area which is calculated by $PS = \frac{1}{2} \times 10 \times 30 = 150$. Total surplus is the sum of CS and PS, therefore $TS = 225 + 150 = 375$.

This is part 2 of a three-parts question. It might be useful to retain your working and answers for the next question.

Assume the market for durian is perfectly competitive. Suppose market demand is given by

$$Q_D = 50 - 2P$$

and market supply is given by

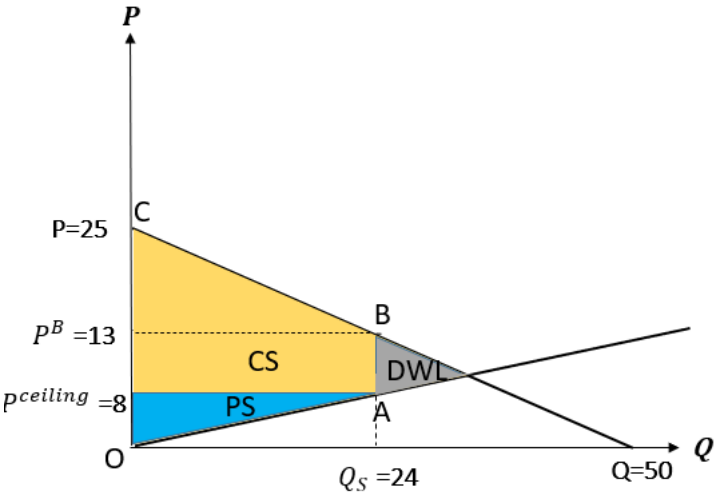
$$Q_S = 3P$$

Suppose the Consumer Protection Association proposes a price ceiling at 8 to protect consumer welfare. Fill in the blanks. If the government accepts the price ceiling, consumer surplus will change by ____, total producer surplus will change by ____, total market surplus will change by ____.

Hint: Note that all answers should be integers. No need to indicate "+" in front of a positive integer but you need to indicate "-" in front of a negative integer.

ΔCS = 39, ΔPS = -54, ΔTS = -15

Refer to the following graph:



CS is represented by the area $CBAP^{ceiling}$ and is calculated as $CS = \frac{1}{2} \times [(13 - 8) + (25 - 8)] \times 24 = 264$, so ΔCS = 264 – 225 =39. PS is represented by the area $OAP^{ceiling}$ and is calculated as $PS = \frac{1}{2} \times 8 \times 24 = 96$, so ΔPS = 96 – 150 = -54. $TS = CS + PS = 264 + 96 = 360$, so ΔTS = 360 – 375 = -15.

This is part 3 of a three-parts question.
Assume the market for durian is perfectly competitive. Suppose market demand is given by

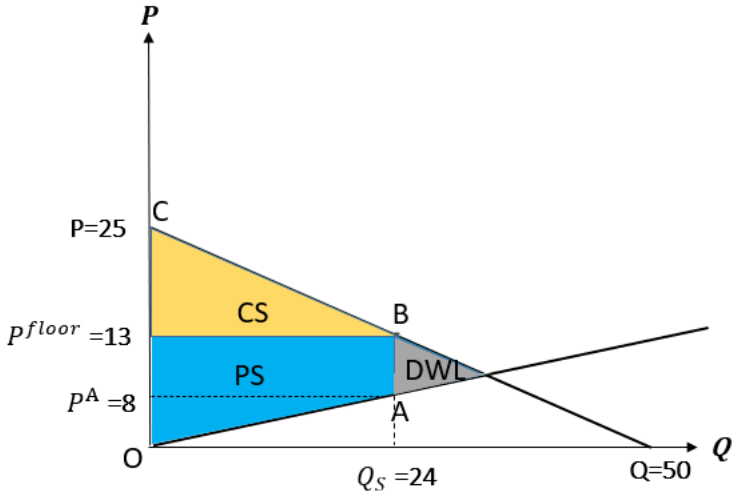
$$Q_D = 50 - 2P$$

and market supply is given by

$$Q_S = 3P$$

.
Suppose the Consumer Protection Association's price ceiling proposal is rejected by the government. The Agricultural Products Protection Association then proposes a price floor at 13 to protect the welfare of durian planters.
Fill in the blanks. If the government accepts the price floor, compared to the initial market equilibrium, consumer surplus will change by ____, total producer surplus will change by ____, total market surplus will change by ____.
Hint: Note that all answers should be integers. No need to indicate "+" in front of a positive integer but you need to indicate "-" in front of a negative integer.

ΔCS = -81, ΔPS = 66, ΔTS = -15
Refer to the following graph:



CS is represented by the area CBP^{floor} and is calculated as $CS = \frac{1}{2} \times (25 - 13) \times 24$=144, so ΔCS = 144 – 225 = -81. PS is represented by the area $OABP^{floor}$ and is calculated as $PS = \frac{1}{2} \times [(13 - 8) + 13] \times 24 = 216$, so ΔPS = 216 – 150 = 66. $TS = CS + PS = 144 + 216 = 360$, so ΔTS = 360 – 375 = -15.

Select the **false** statement.

A. When we plot a perfectly elastic supply curve with price on the vertical and quantity on the horizontal axis, the graph is a horizontal line at a particular P* value.
B. The supply elasticity measures the sensitivity of quantity supplied to price.
C. Holding other factors constant, technological improvements in the production of a good will increase the market equilibrium quantity of the good.
✓D. In the short run, the producer surplus is equal to the sum of all the profits (total revenue minus total cost) of the firms in the market.
E. More than one statement are false.
F. All statements are true.

D is false because producer surplus is equal to total revenue minus variable costs, not total costs. Remember the supply curve is associated with the marginal cost, which has nothing to do with the fixed costs.

Choose the **false** statement.

A. The Lerner index may understate market power if firms are trying to deter potential entrants into the market.
B. Suppose a market has a CR1 of 80. Then it's HHI must be larger than or equal to 6400.
C. An advantage of the HHI over the Lerner Index is that the HHI requires data that is easier to obtain.
✓D. The Lerner Index for a monopoly must be one.
E. More than one substantive statement are false.
F. All substantive statements are true.

A is true, from the notes.
B is true. CR1=80 means the largest firm has 80% of market share. Since HHI is sum of squares that means HHI is at least 80^2.
C is true, from the notes.
D is false, the Lerner Index can be smaller than 1 even for a monopoly.

This is part 1 of a two-parts question. It might be useful to retain your working and final answer for the next question.
A uniform-pricing monopoly faces the demand function Q =800 - 2P and has costs given by TC =4000 +200Q +2Q^2.
Fill in the blanks. The monopolist will produce __1__ units of output at a unit price of __2__. (Round to at least 2 decimal places.)

1. Range - Min:39 Max:41
2. Range - Min:379 Max:381

MC = 200 + 4Q.
Inverse demand function is P = 400 – 0.5Q.
Bisection rule gives MR = 400 – Q.
MR=MC gives Q=40. Then P = 400 – 0.5*40 = 380.

This is part 2 of a two-parts question. It might be useful to retain your working and final answer for the next question.
A uniform-pricing monopoly faces the demand function Q =800 - 2P and has costs given by TC =4000 +200Q +2Q^2.
Fill in the blanks. The monopolist earns a profit of __1__. Its producer surplus is __2__. (Round to at least 2 decimal places. Use negative numbers for losses.)

1. Range - Min:-1 Max:1
2. Range - Min:3999 Max:4001

Profit = 380 * 40 – (4000 + 200*40 + 2*40^2) = 0
PS = variable profits = profits + FC = 4000.

A firm is a profit-maximizing uniform-pricing monopolist in the market of a patented computer software. As an economic analyst, you observe the following data:
a) The monopoly's price is set at $50 per copy.
b) The monopoly's total revenue is $300,000.
c) The monopoly's marginal cost at the profit-maximizing quantity is at $30 per copy.
Based on the observed data, please determine the linear inverse demand function.
Fill in the blanks. Suppose the inverse demand function is of the form

$$P = a - bQ$$

where a, b are both positive constants, determine the value for a: 1 and b: 2.
Hint: a should be an integer, the answer for b should round to four decimal places.

1. 70
2. Range - Min:0.0032 Max:0.0034

At optimum, P*=50, Q*=6000, so we have one equation: 50=a-6000b. The profit maximization condition is given by 30=MC=MR=a-2b×6000. Combine these two equations, we get a=70, b=1/300≈0.0033

This is Part 1 of a four-part question. Be sure to retain your solutions and working for the next part.
Suppose the demand for face masks is given by:

$$Q = 48000 - 16000P$$

and the marginal cost of producing face masks is constant at $1.
Suppose there is a single monopoly producing face masks at the profit maximizing level

Q_m

at the optimal uniform price

P_m

Fill in the blanks. The monopolist's profit maximization production level

Q_m

is __1__ and the optimal price

P_m

is __2__.

1. 16000
2. 2

The inverse demand function is given by P=3-1/16000*Q. At optimum, we have
1=MC=MR=3-1/8000*Q
So we have Q_m=16000, P_m=2

This is Part 2 of a four-part question. Be sure to retain your solutions and working for the next part.
Suppose the demand for face masks is given by:

$$Q = 48000 - 16000P$$

and the marginal cost of producing face masks is constant at $1.
Suppose there is a single monopoly producing face masks at the profit maximizing level

Q_m

at the optimal uniform price

P_m

.
Fill in the blanks. Please find the total consumer surplus: CS = __1__ and total producer surplus PS = __2__

1. 8000
2. 16000

CS=1/2×(3-2)×16000=8000
PS=(2-1)×16000=16000

This is Part 3 of a four-part question. Be sure to retain your solutions and working for the next part.
Suppose the demand for face masks is given by:

$$Q = 48000 - 16000P$$

and the marginal cost of producing face masks is constant at $1.
Now suppose the market for face masks is in perfect competition.
Fill in the blanks. What would be the market equilibrium price __1__ and market equilibrium quantity __2__?

1. 1
2. 32000

Under perfect competition, P_c=MC=1, so Q_c=48000-16000*P_c=32000

This is Part 4 of a four-part question.
Suppose the demand for face masks is given by:

$$Q = 48000 - 16000P$$

and the marginal cost of producing face masks is constant at $1.
Comparing the monopolist market outcome from Part 2 and the perfect competition market outcome from Part 3, what is the social deadweight loss under monopolist market outcome? DWL = 1
Hint: do not need to indicate "-" in front of DWL.

1. 8000

Under perfect competition,
TS=1/2×(3-1)×32000=32000
Under monopoly,
TS=CS+PS=24000
So DWL = 8000

Suppose a profit-maximizing uniform-pricing monopolist faces a downward-sloping linear demand curve. If its marginal cost of production increases, the elasticity of demand at the last quantity produced will become more negative.

✓A. True

B. False

If MC increases, it shifts leftwards. The intersection point between MC and MR shifts leftwards, and quantity shifts leftwards (becomes smaller). We move up (left) the demand curve. Since this is a linear demand curve, elasticity becomes larger in absolute value, i.e. more negative. So this is true.

A profit-maximizing uniform-pricing monopolist sells its goods at a price of 3. We know the marginal cost of its last unit produced is 1.
Choose the **valid** statement.

A. It must have a constant marginal cost.
✓B. It must be facing a downward sloping demand curve.
C. It must be facing a linear demand curve.
D. It must be making a profit.
E. More than one statement are valid.
F. None of the statements are valid.

A is false, monopolists can have upwards sloping MCs and still have a well-defined choice solution.
B is true; the only case where P=MC for a monopolist is when the demand is perfectly elastic.
C is false, demand can be nonlinear and we would still have some well-defined choice solution.
D is false, monopolies can make losses if FC is large enough.

A monopolist practicing third degree price discrimination faces 2 market segments, A and B. The price it charges for segment A is lower than the price it charges for segment B.
Select the **correct** option.

✓A. Segment A has a more negative price elasticity of demand than segment B.
B. Segment A has a less negative price elasticity of demand than segment B.
C. There is not enough information to tell which segment has a more negative price elasticity of demand.

The more elastic segment (more negative price elasticity of demand) gets the lower price, so A is true.

Choose the **true** statement.

A. Suppose we have a monopolist practicing imperfect price discrimination. Then consumer surplus in that market is zero.

B. Suppose we have a monopolist practicing second degree price discrimination. Then consumer surplus in that market is zero.

C. Suppose a monopolist with constant MC faces two identifiable market segments with different demand elasticities. Then, the prices of both market segments under third degree price discrimination will be higher than the price under uniform pricing.

D. More than one substantive statement are true.

✓E. All substantive statements are false.

A and B are false. The firm only extracts all CS in perfect PD.

C is false. The overall demand elasticity will be in between the two market segments (with possibility of being equal to the elasticity in either), so the price will be in between (with possibility of equality) the price in either segment by the rule of thumb.

Choose the **false** statement.

A. Holding all else constant, price discrimination in a market can lead to higher total surplus.
✓B. Suppose we have a monopolist practicing second degree price discrimination. Then consumer surplus in that market is zero.
C. Firms in perfect competition cannot price discriminate.

D. A monopolist practicing third degree price discrimination will charge the more price elastic market segment the lower price.
E. More than one substantive statement are false.
F. All substantive statements are true.

A is true, FDPD is the example.
B is false. FDPD and two-part tariff under very stringent assumptions are the only case of perfect extraction of surplus that you learn.
C is true, you need market power to price discriminate.
D is true, use the monopoly pricing rule to thumb to establish this.

This is Part 1 of a two-part question. Be sure to retain your solutions and working for the next part.
Consider a duopoly in which the two firms produce identical products and are in Cournot competition (competing on quantity). The market demand function is

$$P = 10 - Q$$

, where Q is the total production quantity which is the sum of Firm 1's production level

q_1

and Firm 2's production level

q_2

. Suppose the two firms have symmetric production cost

$$TC_i(q) = q, \text{ for } i = 1,2$$

Fill in the blanks. Please find the Cournot Equilibrium production level

q_1^*

: __1__ and

q_2^*

: __2__ as well as the optimal profit to each firm

π_1^*

: __3__ and

π_2^*

: __4__.
Hint:

$$TC_i(q) = q, \text{ for } i = 1,2$$

means that

$$TC_1(q) = q$$

for Firm 1 and

$$TC_2(q) = q$$

for Firm 2.

1. 3
2. 3
3. 9
4. 9

Total demand must be met by two firms: P = 10 – q1 – q2
Firm 1's total revenue: TR1 = P*q1 = (10 – q1 – q2)*q1 = 10q1 – q1^2 – q1q2
Firm 1's marginal revenue: MR1 = d(TR1)/dq1 = 10 – 2q1 – q2
Firm 1's marginal cost: MC1 = d(TC1)/dq1 = 1
Firm 1's reaction function (from MR1 = MC1): 10 – 2q1 – q2 = 1
Simplify: q1 = 4.5 – 0.5*q2
Firm 2's reaction function is symmetric: q2 = 4.5 – 0.5*q1
Solve for eqm: q1 = 4.5 – 0.5*(4.5 – 0.5*q1)
0.75*q1 = 2.25
q1 = 3
q2 = 3
P = 10 – 3 – 3 = 4
Profit1 = 4*3 – 3 = 9
Profit2 = 9 by symmetry

This is Part 2 of a two-part question. Be sure to retain your solutions and working for the next part.
Consider a duopoly in which the two firms produce identical products and are in Cournot competition (competing on quantity). The market demand function is

$$P = 10 - Q$$

, where Q is the total production quantity which is the sum of Firm 1's production level

$$q_1$$

and Firm 2's production level

$$q_2$$

. Suppose the two firms have symmetric production cost

$$TC_i(q) = q, \text{for } i = 1,2$$

Now suppose the two firms could collude in the following manner: they could act like a monopoly (charge the optimal unform price) and split the monopoly profit equally. Let us denote the overall monopoly profit by

$$\pi_m$$

, then each firm's profit will be

$$\frac{1}{2}\pi_m$$

under collusion.
Fill in the blanks. Please determine the increase/decrease in profits for each firm

$$\frac{1}{2}\pi_m - \pi_1^*$$

for firm 1: __1__ and

$$\frac{1}{2}\pi_m - \pi_2^*$$

for firm 2: __2__.
Hint: Use a positive number for an increase and a negative number (indicate "-" in front) for a decrease.

1. Range - Min:1.12 Max:1.14
2. Range - Min:1.12 Max:1.14

P = 10 – Q
MR = 10 – 2Q
MC = 1
MR = MC gives 10 – 2Q = 1, simplify: Q = 4.5
P = 10 – 4.5 = 5.5
Total profit = 5.5*4.5 – 4.5 = 20.25
Profit1 = Profit2 = 10.125
Increase in profit for each firm = 10.125 – 9 = 1.125

This is part 1 of a two-parts question. It might be useful to retain your working and final answer for the next question.
Suppose we have 2 firms competing on quantity in a homogenous-goods market. The market inverse demand function is P=17-0.5Q, and each firm has cost function

$$TC_i = 5 + 8q_i + \frac{3}{2}q_i^2$$

, for i=1,2.
Fill in the blanks. In the Cournot equilibrium, the market price is __1__, firm 1 produces __2__ units, and firm 2 produces __3__ units. (Round to at least 2 decimal places.)

1. Range - Min:14.9 Max:15.1
2. Range - Min:1.9 Max:2.1
3. Range - Min:1.9 Max:2.1

You should know compete on quantity means Cournot.
$MC_i = 8 + 3q_i$.
$P = 17 – 0.5Q = 17 – 0.5q_1 – 0.5q_2$.
$TR_1 = 17q_1 – 0.5q_1^2 – 0.5q_1q_2$.
$MR_1 = 17 – q_1 – 0.5q_2$.
Equating marginals give $17 – q_1 – 0.5q_2 = 8 + 3q_1$.
Simplify to get $9 = 4q_1 + 0.5q_2$.
We have symmetry, so $q_1 = q_2$.
Substitute to get $9 = 4.5q_1$.
Solve: $q_1 = 2$.
$q_2 = 2$.
$P = 17 – 0.5*2 – 0.5*2 = 15$.

This is part 2 of a two-parts question.
Suppose we have 2 firms competing on quantity in a homogenous-goods market. The market inverse demand function is P=17-0.5Q, and each firm has cost function

$$TC_i = 5 + 8q_i + \frac{3}{2}q_i^2$$

, for i=1,2.
Fill in the blanks. In the Cournot equilibrium, firm 1 makes __1__ in profit and firm 2 makes __2__ in profit. (Round to at least 2 decimal places. Use negative numbers for losses.)

1. Range - Min:2.9 Max:3.1
2. Range - Min:2.9 Max:3.1

Profit of each firm = 15*2 – (5+8*2+3/2*2^2) = 3.

Consider a duopoly (firm 1 and firm 2) in a homogeneous goods market. Market demand is given by Q = 100 - 4P. Suppose that the costs for the two firms are given by $MC_1 = MC_2 = 5$, and the firms have no fixed costs. The two firms collude in the following manner: they act like a monopoly (charge the optimal unform price) and split the monopoly profit equally.
Fill in the blanks. In the collusion equilibrium, firm 1 produces __1__ units and firm 2 produces __2__ units.

1. Range - Min:19.9 Max:20.1
2. Range - Min:19.9 Max:20.1

The inverse demand curve is P = 25 – 0.25Q. Marginal revenue of the cartel is MR = 25 – 0.5Q. Set MR=MC to get Q=40. Split this between the two firms to get 20 each.

Consider a duopoly (firm 1 and firm 2) in price competition in a homogeneous goods market. Market demand is given by Q = 200 - 8P. Assume that the lower-pricing firm takes the whole market, and if the two firms sets equal prices, they split the market equally. Suppose that the costs for the two firms are given by $MC_1 = MC_2 = 5$, and firms have no fixed costs.
Fill in the blanks. In the Bertrand equilibrium, the market price will be __1__, firm 1 produces __2__ units, and firm 2 produces __3__ units. (Round to at least 2 decimal places.)

1. Range - Min:4.9 Max:5.1
2. Range - Min:79.9 Max:80.1
3. Range - Min:79.9 Max:80.1

In Bertrand eqm, p=MC=5. Substitute into demand, Q=160, so each firm produces 80.

Choose the **false** statement regarding firms in a duopoly.

A. If the firms were in Bertrand competition, they play a simultaneous game, competing in price.
B. If we wanted to analyze the duopoly using the Cournot competition model taught in this course, we need the firms to have constant average total cost.
C. Suppose two firms that are in Cournot competition colluded to form a cartel. Then, total market output will increase.
D. If we wanted to analyze the duopoly using the Cournot competition model taught in this course, we need the firms to be symmetric.
✓E. More than one substantive statement are false.
F. All substantive statements are true.

A is true, this is the main characteristic of Bertrand competition.
B is false, this is not one of the required assumptions for Cournot.
C is false, the monopoly equilibrium produces less output compared to Cornot.
D is false, they can be asymmetric to use the tools from this course.

The options below show examples of a concept taught in class. Select the **incorrect** example.

A. Moral hazard: An entrepreneur takes on excessive debt because if the business fails, he can declare bankruptcy and his HDB flat (public housing flat) cannot be seized.
✓B. Adverse selection: Rich Americans donate less as a percent of their income than poor Americans because donating takes time, and they have a very high opportunity cost of time.
C. Signaling: To distinguish itself from other universities that are not as committed to environmental, social, and corporate governance (ESG), NUS famously disallows cheap disposable utensils for meetings and internal seminars.
D. Screening: Employers use job interviews to assess the qualifications, skills, and suitability of job applicants.

A is moral hazard; the transaction is between the entrepreneur and the owner of the debt, and the bad action is excessive debt-taking which doesn't result in bad outcomes when it fails.
B is not adverse selection because there is no hidden information anywhere.
C is signaling since not allowing disposable utensils is costly.
D is simple screening by the definition given in the lecture.