

## Quantitative Economics

Consider a null hypothesis the population mean height is 5 feet. Test A has a significance (alpha) level of 0.05, and another test B has a significance level of 0.01. The power of the two tests has the following characteristic:

- a) Test A has greater power than test B.
- b) To compare the relative power of tests A and B, we need to know the alternative hypothesis in each case.
- c) Test B has greater power than test A.
- d) The power of the tests is independent of their significance levels.

Suppose  $X$  is a continuous random variable, with mean  $E(X)$  and variance  $V(X)$ . Which of the following statements is true.

- a) The uncertainty in  $X$  is fully characterized by its probability density function.
- b) The uncertainty in  $X$  is fully characterized by  $E(X)$  and  $V(X)$ .
- c) The uncertainty in  $X$  is fully characterized by  $V(X)$ .
- d) The uncertainty in  $X$  cannot be fully characterized because it is continuous.

Suppose  $X$  is a uniform random variable on the interval 5 to 7. Let  $f(x)$  be its probability density function. Which of the following statements is true:

- a)  $f(x)=6$  for all  $x$  in  $(5,7)$  and is 0 otherwise.
- b)  $f(x)=1$  for all  $x$  in  $(5,7)$  and is 0 otherwise.
- c)  $f(x)=2$  for all  $x$  in  $(5,7)$  and is 0 otherwise.
- d)  $f(x)=0.5$  for all  $x$  in  $(5,7)$  and is 0 otherwise.

Suppose the 95% confidence interval for population mean height of Indian women is (5.2, 6.0). What is your best guess among the options below about the 99% confidence interval for the same population mean.

- a) It is (5, 6.2).
- b) It is [5.4, 5.8].
- c) It is (5.4, 5.8).
- d) It can be either (5.4, 5.8) or [5.4, 5.8] as both are equivalent.

The heights of a certain population of males are normally distributed with mean 68 inches and standard deviation 7 inches. The proportion of the population whose height is greater than 61 inches is approximately:

- a) 84%
- b) 99%
- c) 68%
- d) 16%

Samples of size 64 are selected from a population with mean 20 and standard deviation 16. The standard error of the sampling distribution of sample means is

- a) 4
- b) 2
- c) 0.25
- d) 0.50

Thirty students take two courses - Intermediate Microeconomics one semester and Intermediate Macroeconomics in the following semester. Their overall course grades in percentage are listed below for both courses. Which of the following statistical procedures would be most appropriate to test the claim that the student's overall course grades are the same in both courses? Assume that any necessary normality requirements hold.

Student	1	2	3	4	5
Intermediate Microeconomics	70%	62.6%	89%	91.3%	58.9%
Intermediate Macroeconomics	65.5%	61.0%	83.2%	93.0%	44.8%

- a) Two-tailed two-sample paired/dependent t-test of means
- b) Two-tailed two-sample independent t-test of means
- c) Two-tailed two-sample independent z-test of means
- d) One-tailed two-sample z-test of proportions

Suppose an insurance company divides its population into two classes - those who are prone to have accidents and those who are not. The data shows that there is a 10% probability that an accident-prone person will have an accident in a 1-year period. The probability for all others is 5%. If the probability of a new policyholder being accident-prone is 20%, find the probability that a new policyholder will have an accident in the first year:

- a) 10%
- b) 33%
- c) 40%
- d) 6%

For any linear regression model where Y is the dependent variable one can derive the expression as given here. Each term in the equation has its usual interpretation.  $y_i$  is the value of the  $i^{th}$  observation of y in the data.  $\hat{y}_i$  is the value of the  $i^{th}$  observation as predicted by the regression model and  $\bar{y}$  is the mean of n observations of the dependent variable y.

$$\sum_{i=1}^n (y_i - \bar{y})^2 = \sum_{i=1}^n (\hat{y}_i - \bar{y})^2 + \sum_{i=1}^n (y_i - \hat{y}_i)^2$$

$$A = B + C$$

Which of the options in the multiple choice is correct.

- a) A high ratio of B/A indicates that the model explains a lot of variability in y.
- b) A high ratio of C/A indicates that the model explains a lot of variability in y.
- c) A low ratio of B/A indicates that the model explains a lot of variability in y.
- d) Variability in y cannot be explained by this equation

Figure 1 shows the results of a survey comparing the change in income from before the pandemic to after the pandemic across income groups. The y-axis represents the income category of the households and the x-axis represents the percentage of households. INR in the figure refers to Indian rupees. “Same” in Figure 2, indicates that the households have said that there was no change in income before and after the pandemic while “Decreased” in figure indicates that the households have said their household incomes decreased post pandemic.

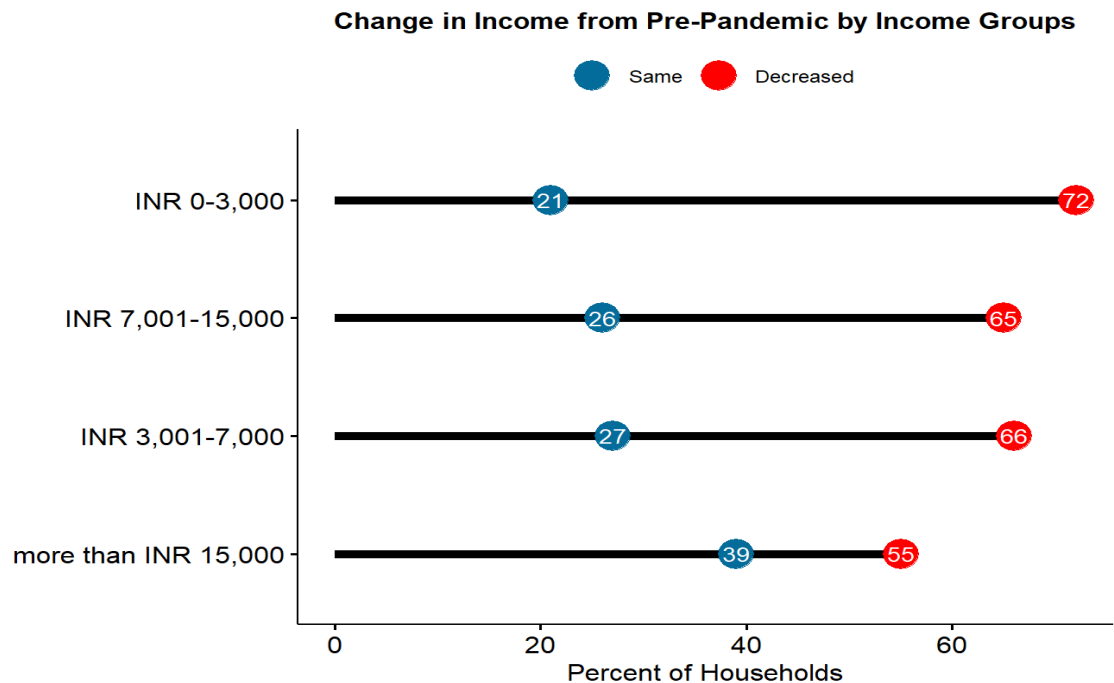


Figure 1: Change in income-by-income groups

Assuming that incomes either remained the same, decreased or increased post-pandemic compared to pre-pandemic, which among the following options is correct.

- The income group more than INR 15,000 had the most percentage of households reporting an increase in income.
- The income group INR 7,001 - 15,000 had the most percentage of households reporting an increase in income.
- The income group more than INR 15,000 had the least percentage of households reporting an increase in income.
- The income group INR 3,001 - 7,000 had the most percentage of households reporting an increase in income.

## Macroeconomics

Consider an open economy ISLM model. According to Mundell-Fleming, which of the following cannot be effective simultaneously?

- a) free capital flow, autonomous monetary policy, flexible exchange rate
- b) free capital flow, autonomous monetary policy, fixed exchange rate
- c) free capital flow, fiscal policy, fixed exchange rate
- d) monetary policy and fiscal policy under closed economy

Consider a closed economy where consumption propensity is 0.5 and government budget is always balanced. If government expenditure rises by 1 unit, by how much will output rise under balanced budget multiplier?

- a) 0.5
- b) 1
- c) 2
- d) 0

The inflation rate of an economy rises. If the central bank wants to reduce inflation rate, which of the following policies will it implement?

- a) Reduce interest rate
- b) Increase interest rate
- c) Depreciate nominal exchange rate
- d) Sell government bonds

Consider 2 economies, A and B, which have equal consumption and import propensities. Government expenditure rises in country A by Rs. 100, while its exports remain unchanged. Exports rise in country B by Rs. 100, while its government expenditures remains same. If trade balance is the difference between export and import, which of the following proposition is correct?

- a) Trade balance improves in Country A and B by equal amount
- b) Trade balance deteriorates in Country A and B by equal amount
- c) Trade balance improves in A, deteriorates in B
- d) Trade balance improves in B, deteriorates in A

Which of the following statement is wrong?

- a) Philips curve will shift upward in the case of cost-push inflation
- b) Short Run Philips curve is vertical under adaptive expectation
- c) Philips Curve is vertical under rational expectation
- d) Philips Curve is unstable under adaptive expectation

Consider a simple Keynesian model. The consumption function of an economy is given by  $C = 50 + 0.5Y$ . Investment expenditure,  $I = 100$ . Output is given by  $Y = C + I$ . Now suppose investment expenditure rises by 20 units. Which of the following statement is correct?

- a) Equilibrium output rises from 300 to 340
- b) Equilibrium output rises from 300 to 320
- c) Equilibrium output rises from 150 to 190
- d) Equilibrium output rises from 150 to 170

If everyone prefers holding cash to holding bond, this situation would be known as?

- a) Widow's curse
- b) Liquidity trap
- c) Paradox of thrift
- d) None of the above

If marginal propensity to consume goes up in the economy, then

- a) Level of IS curve will change
- b) Slope of IS curve will change
- c) Level of LM curve will change
- d) Slope of LM curve will change

Suppose, the LM curve is positively sloped and the IS curve is negatively sloped. If money supply is increased by the monetary authority, then in the IS-LM framework it will

- a) Reduce investment
- b) Increase investment
- c) Have no effect on investment
- d) Can't say

Which of the following is not a monetary policy instrument

- a) Repo rate
- b) Cash Reserve Ratio
- c) Reverse repo rate
- d) Capital adequacy ratio

### Microeconomics

The figure below shows the demand curve for candies. Which of the following statements is true?

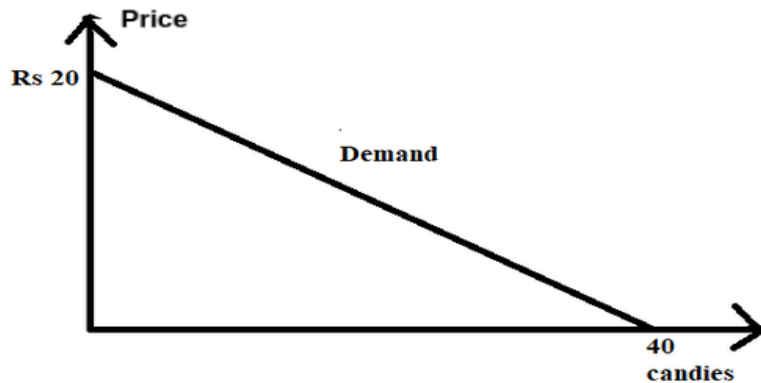


Figure X. Figure for question (X)

- a) The inverse demand function is given by the equation  $P = 40 - 2Q$
- b) The marginal revenue can be expressed as a function of quantity as follows:  $MR = 20Q - 0.5Q^2$
- c) The marginal revenue can be expressed as a function of quantity as follows:  $MR = 20 - Q$
- d) Without more information, neither the inverse demand function nor the marginal revenue function can be determined.

The marginal rate of substitution of good y with respect to good x is given by  $mrs(x,y) = \frac{\text{Marginal utility of } x}{\text{Marginal utility of } y}$ . Consider the Cobb-Douglas utility function  $u(x,y) = x^{0.2}y^{0.8}$ . Select which of the following statements is the correct interpretation of the MRS.

- a) The consumer will be indifferent if 4 units of good y are exchanged with 1 unit of good x
- b) The consumer will be indifferent if 1 unit of good y are exchanged with 4 units of good x
- c) The consumer will be indifferent if  $y/4x$  units of good y are exchanged with 1 unit of good x
- d) The consumer will be indifferent if 1 units of good y are exchanged with  $y/4x$  unit of good x

Let the preference of a consumer over tea and biscuits be given by  $u(t,b)=\min\{2t,b\}$ , where  $t$  is the number of cups of tea, and  $b$  is the number of biscuits. The price of tea is Rs 10 per cup and the price of one biscuit is Rs 2. the person has a total of Rs 28 to spend. What is the amount of tea and biscuits that the consumer will buy to maximise their utility?

- a) 1 cup of Tea and 2 Biscuits.
- b) 2 cups of Tea and 1 Biscuit.
- c) 2 cups of Tea and 4 Biscuits.
- d) 4 cups of Tea and 2 Biscuits.

Consider the market for a perfectly competitive good called G with a linear downward demand curve. If the price of a substitute good, called S, decreases, what will happen to the demand of the good G? (Recall: A demand curve is drawn on a plane with price on Y axis versus quantity on X axis)

- a) Demand for G will shift to the right, because people will substitute S with G.
- b) Demand for G will shift to the left, because people will substitute G with S.
- c) Demand for G will be the same, but the demand curve will become non-linear, because different consumers will substitute G and S in different proportions.
- d) Demand for G will be the same and it will remain linear, but the slope of the demand curve will change, because the relative price ratio of S and G has changed.



Consider the following graph depicting a monopolist's marginal revenue (MR), marginal cost (MC) and the market demand curve. Which of the following statements is true?

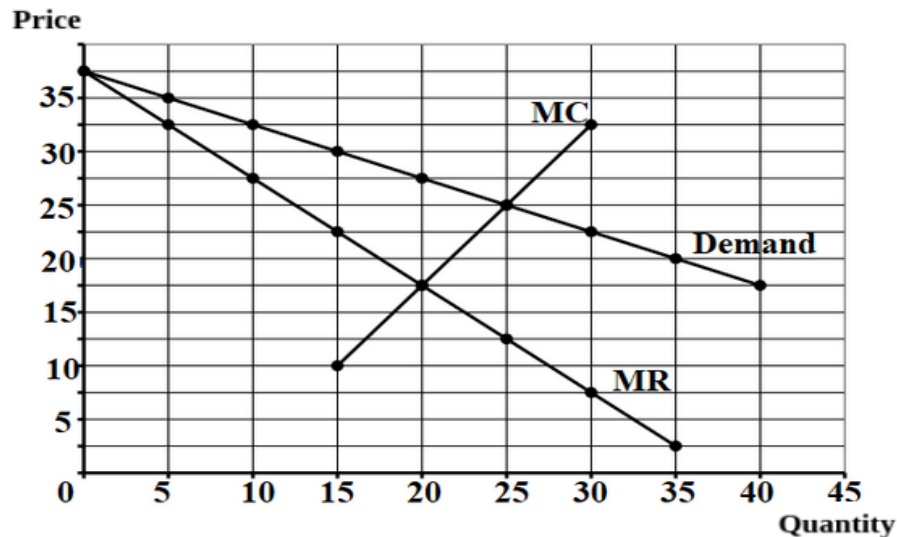


Figure X. Figure for question (X)

- a) The monopolist will charge 17.5 rupees per unit and sell 20 units.
- b) The monopolist will charge 25 rupees per unit and sell 12.5 units.
- c) The monopolist will charge 25 rupees per unit and sell 25 units.
- d) The monopolist will charge 27.5 rupees per unit and sell 20 units.

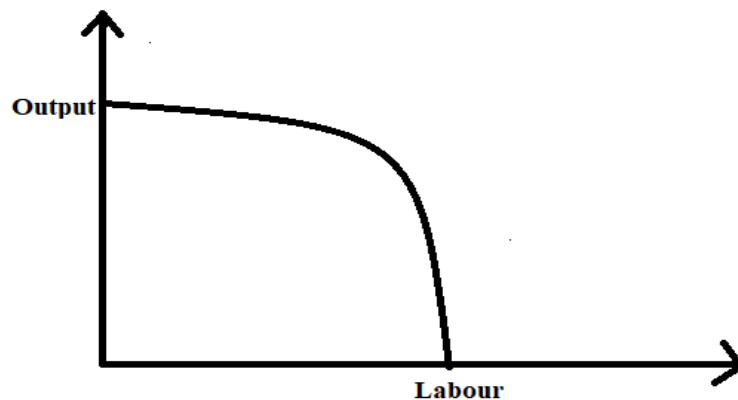
Which of the following decisions will increase the economic profit of a firm with increasing marginal cost operating in a perfectly competitive market?

- a) The firm decreases output if the price of a good exceeds its marginal cost of production.
- b) The firm increases output if the price of a good is less than its marginal cost of production.
- c) The firm decreases output if the price of a good is less than its marginal cost of production.
- d) The firm charges a higher price if the existing price is equal to its marginal cost of production.

It is believed that an educated citizen has positive externalities for other citizens. The government should provide scholarships and subsidies for college education, because:

- a) The marginal private cost is more than the marginal social cost, hence college education will be under-supplied in competitive equilibrium
- b) The marginal private cost is less than the marginal social cost, hence college education will be under-supplied in competitive equilibrium
- c) The marginal private benefit is more than the marginal social benefit, hence college education will be under-demanded in competitive equilibrium
- d) The marginal private benefit is less than the marginal social benefit, hence the college education will be under-demanded in competitive equilibrium

Which of the following statements about the figure below is true?



- a) The graph above shows that hiring more labour increases output.
- b) The graph above shows that an increase in the level of an input leads to a decrease in the quantity produced.
- c) The graph above is known as the production possibilities frontier as it shows the possible levels of output for different levels of input (labour).
- d) The graph above is an accurate representation of how labour and output are related in the real world.

A firm that has a monopoly over good X observes that when it decreases the price of the good from Rs 100 to Rs 90, its total revenue decreases from Rs 1,00,000 to Rs 99,000. What is the elasticity of demand of good X with respect to its price?

- a) 10
- b) 5
- c) 1
- d) 1/10

An individual likes both income and leisure and can decide how much time they want to work, and how much time they want to keep aside for leisure. If the exogenously given hourly wage increases (while everything else remains the same), which of the following statements must be true?

- a) One can now earn the same amount of money by working fewer hours, therefore for any rational individual, an increase in hourly wage will always result in fewer hours of work.
- b) One can now earn more money by working the same number of hours, therefore for any rational individual, an increase in hourly wage will not change the hours of work.
- c) For any individual, every extra hour of leisure is now costlier, therefore an increase in hourly wage will always result in more hours of work.
- d) We need more information to determine whether working hours will actually increase or decrease.

## **Section 2: Essay Type Questions**

Answer the following questions in about 800 words.

Recently there has been a revival of interest in what has happened to India's poverty rate in the past decade. The poverty rate is usually measured using the Head Count Ratio (HCR) or the percentage of households below a poverty line. Explain the pros and cons of using the HCR to measure poverty (mention one pro and one con and explain). What other approaches to poverty measurement are available to us? Take one example and explain if it overcomes some shortcomings of the HCR approach?

Answer the following questions in about 800 words.

A recent study argued that since the early 2000s, the world economy had experienced "unconditional convergence" between rich and poor countries. Drawing on the Solow model of economic growth, explain what is meant by the term unconditional convergence. Also explain the difference between unconditional and conditional convergence.