

DU MPhil Phd in Economics

Topic:- ECO MPHIL

- 1) Find the number of rational roots for the following equation: $2x^4 + 5x^3 - 5x^2 - 10x + 8 = 0$

[Question ID = 9468]

1. **2**
[Option ID = 37869]
2. **1**
[Option ID = 37870]
3. **4**
[Option ID = 37871]
4. **0**
[Option ID = 37872]

- 2) Find $\lim_{x \rightarrow \infty} \left[(x^3 + 5x^2 + 7x + 3)^{\frac{1}{3}} - x \right]$

[Question ID = 9469]

1. $\frac{5}{3}$
[Option ID = 37873]
2. $\frac{3}{7}$
[Option ID = 37874]
3. **0**
[Option ID = 37875]
4. This sequence does not converge
[Option ID = 37876]

- 3) Let f be a continuous and differentiable function such that $f(x) = x^5 + 7x^3 + 3x - 5$ and $f(x)$ has an inverse function g . Find $g'(-5)$, where g' is the derivative of g .

[Question ID = 9470]

1. $\frac{1}{3}$
[Option ID = 37877]
2. $-\frac{1}{2}$
[Option ID = 37878]
3. -5
[Option ID = 37879]
4. **7**
[Option ID = 37880]

- 4) Let $f : [0, 1] \rightarrow \Re$ be a continuous function. $\Re$ is the set of real numbers and $[0, 1]$ is the closed interval between 0 and 1. Which of the following is true?

[Question ID = 9471]

1. There is a $x_0 \in [0, 1]$ such that $f(x_0) = \frac{1}{3} \left(f\left(\frac{1}{4}\right) + f\left(\frac{1}{2}\right) + f\left(\frac{3}{4}\right) \right)$
[Option ID = 37881]
2. There is a $x_0 \in [0, 1]$ such that $f(x_0) = \frac{1}{2} \left(f\left(\frac{1}{4}\right) + f\left(\frac{1}{2}\right) + f\left(\frac{3}{4}\right) \right)$
[Option ID = 37882]
3. There is a $x_0 \in [0, 1]$ such that $f(x_0) = f\left(\frac{1}{2}\right) - f\left(\frac{1}{4}\right)$
[Option ID = 37883]
4. There is a $x_0 \in [0, 1]$ such that $f(x_0) = 0.5$
[Option ID = 37884]

5)

Let P and Q be $n \times n$ matrices and $PQ = Q^3P$. Find, $(PQ)^2$.

[Question ID = 9472]

1. $(PQ)^2 = Q^{12}P^2$

[Option ID = 37885]

2. $(PQ)^2 = Q^6P^2$

[Option ID = 37886]

3. $(PQ)^2 = Q^8P^4$

[Option ID = 37887]

4. $(PQ)^2 = Q^2P^2$

[Option ID = 37888]

6)

Consider the vector space $\Re^3$ over the field of real numbers; and the following subsets of $\Re^3$. Which of the following is a subspace of $\Re^3$?

[Question ID = 9473]

1. $\{(x, y, z) \in \Re^3 | x + 5y + 2z = 2\}$

[Option ID = 37889]

2. $\{(x, y, z) \in \Re^3 | (x - 1) = (y - 2) = \frac{z}{2}\}$

[Option ID = 37890]

3. $\{(x, y, z) \in \Re^3 | x + y + z = 0\} \cup \{(x, y, z) \in \Re^3 | x - y + z = 0\}$

[Option ID = 37891]

4. $\{(x, y, z) \in \Re^3 | x = z\}$

[Option ID = 37892]

7)

An $n \times n$ matrix A is called *nilpotent* if $A^k = \mathbf{0}$ for some positive integer k . Here $\mathbf{0}$ denotes the zero matrix. Which of the following must be true for a nilpotent matrix?

[Question ID = 9474]

1. $A = 0$

[Option ID = 37893]

2. A has at least two distinct eigenvalues

[Option ID = 37894]

3. A is invertible

[Option ID = 37895]

4. If A is diagonalizable and nilpotent then $A = 0$

[Option ID = 37896]

8)

Suppose $|a| < 1$, $|b| < 1$ and $a \neq b$, where $|x|$ is the modulus of x . Consider matrix M .

$$M = \begin{pmatrix} a & (b-a) \\ 0 & b \end{pmatrix}$$

Let $S = \sum_{k=1}^{\infty} M^k$. Which of the following is true?

[Question ID = 9475]

1. S is a singular matrix

[Option ID = 37897]

2. S is symmetric

[Option ID = 37898]

3. S and M have the same eigenvectors

[Option ID = 37899]

4. S and M have the same eigenvalues

[Option ID = 37900]

9)

Suppose $u = x^4 g\left(\frac{y}{x}, \frac{z}{x}\right)$. Find $\left(x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z}\right)$.

Assume that u is differentiable. $\frac{\partial u}{\partial x}$ etc. denote partial derivatives of u

[Question ID = 9476]

1. $2u^2 - u$

[Option ID = 37901]

2. $3u + 1$

[Option ID = 37902]

3. u^2

[Option ID = 37903]

4. $4u$

[Option ID = 37904]

10)

Find the equation of the sphere which has the two planes $x + y + z = 3$ and $x + y + z = 9$ as tangent planes and the centre of the sphere is on the planes $x - y = 0$ and $x - z = 0$.

[Question ID = 9477]

1. $(x - 1)^2 + (y - 2)^2 + (z - 3)^2 = 9$

[Option ID = 37905]

2. $(x - 1)^2 + (y - 2)^2 + (z - 3)^2 = 3$

[Option ID = 37906]

3. $(x - 2)^2 + (y - 2)^2 + (z - 2)^2 = 9$

[Option ID = 37907]

4. $(x - 2)^2 + (y - 2)^2 + (z - 2)^2 = 3$

[Option ID = 37908]

11)

Let f be defined as follows:

$$f(x, y) = \frac{xy^3}{x^3 + y^6} \text{ if } (x, y) \neq (0, 0); \quad f(0, 0) = 0$$

Which of the following statements is true?

[Question ID = 9478]

1. f is continuous at $(0, 0)$

[Option ID = 37909]

2. f has partial derivatives at $(0, 0)$

[Option ID = 37910]

3. Directional derivative of f at $(0, 0)$ in some directions do not exist

[Option ID = 37911]

4. f is differentiable at $(0, 0)$

[Option ID = 37912]

12)

Find the maximum of $(x - y)$ such that $|x| + |y| = 1$
($|x|$ denotes modulus of x)

[Question ID = 9479]

1. 0

[Option ID = 37913]

2. 1

[Option ID = 37914]

3. 2

[Option ID = 37915]

4. Maximum does not exist

[Option ID = 37916]

13)

$\{x_n\}_{n=1}^{\infty}$ denotes a sequence of real numbers.

Given below are two statements

Statement I: $\{|x_n|\}_{n=1}^{\infty}$ converges $\Leftrightarrow \{x_n\}_{n=1}^{\infty}$ converges
(where $|x|$ denotes modulus of x)

Statement II: $\{nx_n\}_{n=1}^{\infty}$ converges $\Leftrightarrow \{x_n\}_{n=1}^{\infty}$ converges to 0

In light of the above statements, choose the **correct** answer from the options given below

[Question ID = 9480]

1. Both Statement I and II are true

[Option ID = 37917]

2. Both Statement I and II are false

[Option ID = 37918]

3. Statement I is true but Statement II is false

[Option ID = 37919]

4. Statement I is false but Statement II is true

[Option ID = 37920]

14)

There are $2n$ identical rooms in a hostel and there are $4n$ students;

$2n$ economists and $2n$ sociologists. Two students are assigned to each room.

An allocation is the list of all pairs. For example, if there are three rooms and

six students, A, B, C, D, E, F ; then one possible allocation is $[(A, B), (C, D), (E, F)]$;

another allocation is $[(A, B), (C, F), (D, E)]$.

How many allocations are possible where exactly n rooms have one economist

and one sociologist? Assume that n is even. Factorial of k is denoted by $k!$ and k choose l is denoted by $\binom{k}{l}$.

[Question ID = 9481]

1. $\binom{2n}{n}^2 (n!)$

[Option ID = 37921]

2. $(n!) \left[\frac{n!}{\left(\frac{n}{2}\right)! 2^{\frac{n}{2}}} \right]^2$

[Option ID = 37922]

3. $\binom{2n}{n}^2 \left[\frac{n!}{\left(\frac{n}{2}\right)! 2^{\frac{n}{2}}} \right]^2$

[Option ID = 37923]

4. $\binom{2n}{n}^2 (n!) \left[\frac{n!}{\left(\frac{n}{2}\right)! 2^{\frac{n}{2}}} \right]^2$

[Option ID = 37924]

15) Which of the following is an open set in $\mathbb{R}^2$ under Euclidean distance?

[Question ID = 9482]

1. $\left\{ \begin{pmatrix} z_1 \\ z_2 \end{pmatrix} \in \mathbb{R}^2 \mid z_1 = 0 \right\}$

[Option ID = 37925]

2. $\left\{ \begin{pmatrix} z_1 \\ z_2 \end{pmatrix} \in \mathbb{R}^2 \mid z_1 > 0 \text{ or } z_2 > 0 \right\}$

[Option ID = 37926]

3. $\left\{ \begin{pmatrix} z_1 \\ z_2 \end{pmatrix} \in \mathbb{R}^2 \mid z_1 = z_2 \text{ and } z_2 > 0 \right\}$

[Option ID = 37927]

4. $\left\{ \begin{pmatrix} z_1 \\ z_2 \end{pmatrix} \in \mathbb{R}^2 \mid z_1^2 + z_2^2 \leq 1 \right\}$

[Option ID = 37928]

16) Rohan consumes only two normal goods: 1 and 2. If price of good 1 falls while price for good 2 remains unchanged, which of the following is true?

[Question ID = 9483]

1. Income effect under Hicksian price decomposition is greater than the income effect under Slutsky's price decomposition
[Option ID = 37929]
2. Income effect under Hicksian price decomposition is less than the income effect under Slutsky's price decomposition
[Option ID = 37930]
3. Income effect under Hicksian price decomposition is the same as the income effect under Slutsky's price decomposition
[Option ID = 37931]
4. Income effect under Hicksian price decomposition and that under Slutsky's price decomposition cannot be ranked. It depends on the utility function.
[Option ID = 37932]

17)

Consider a firm with two inputs K and L . Its production function is $f(k, l) = \min\{(k + l), 2l\}$.

Find the cost function of this firm.

Suppose that r and w denote the prices of K and L respectively and y is the production.

[Question ID = 9484]

1. $(r + w)y$
[Option ID = 37933]
2. $(r + w)\frac{y}{2}$
[Option ID = 37934]
3. $r\frac{2y}{3} + w\frac{y}{3}$
[Option ID = 37935]
4. $r\frac{y}{3} + w\frac{2y}{3}$
[Option ID = 37936]

18) Which of the following statements is true?

[Question ID = 9485]

1. A complete preference is transitive.
[Option ID = 37937]
2. A transitive preference is complete.
[Option ID = 37938]
3. Completeness and transitivity are equivalent.
[Option ID = 37939]
4. Completeness and transitivity are independent.
[Option ID = 37940]

19)

Consider the following lotteries.

Lottery A: Win Rs. 10 with probability 0.6; win Rs. 20 with probability 0.4

Lottery B: Win Rs. 2.50 with probability 0.8; win Rs. 60 with probability 0.2

Lottery C: Win Rs. 2.50 with probability 0.8; win Rs. 20 with probability 0.1; win Rs. 100 with probability 0.1

Suppose that $\succ$ denotes strict preference and $\sim$ denotes indifference.

Any risk averse individual with non-decreasing utility in money must have:

[Question ID = 9486]

1. Lottery A $\succ$ Lottery B $\sim$ Lottery C
[Option ID = 37941]
2. Lottery A $\sim$ Lottery B $\sim$ Lottery C
[Option ID = 37942]
3. Lottery A $\sim$ Lottery B $\succ$ Lottery C
[Option ID = 37943]
4. Lottery A $\succ$ Lottery B $\succ$ Lottery C
[Option ID = 37944]

20) If one uses Pareto criterion to rank all feasible allocations in an exchange economy then the ordering would be[Question ID = 9487]

1. Complete and transitive [Option ID = 37945]
2. Complete but not transitive [Option ID = 37946]
3. Transitive but not complete [Option ID = 37947]
4. Neither complete nor transitive [Option ID = 37948]

21) Suppose a buyer wants to purchase a product from a seller. Buyer's maximum willingness to pay and seller's cost are both drawn independently from the

$Uniform[0, 1]$

distribution. What is the expected gains from trade assuming that trade takes place whenever buyer's maximum willingness to pay exceeds seller's cost?

[Question ID = 9488]

1. $\frac{1}{4}$
[Option ID = 37949]
2. $\frac{2}{3}$
[Option ID = 37950]
3. $\frac{1}{6}$
[Option ID = 37951]
4. $\frac{1}{2}$
[Option ID = 37952]

22)

Consider an industry comprising of two firms with identical and constant marginal cost c , facing demand $Q = 1 - P$. Let W_c , W_n and W_l denote welfare under price-taking, Cournot competition and Stackelberg leadership respectively. Rank W_c , W_n and W_l .

[Question ID = 9489]

1. $W_l \geq W_n \geq W_c$
[Option ID = 37953]
2. $W_l \geq W_c \geq W_n$
[Option ID = 37954]
3. $W_c \geq W_n \geq W_l$
[Option ID = 37955]
4. $W_c \geq W_l \geq W_n$
[Option ID = 37956]

23)

Consider an exchange economy with two agents, 1 and 2, and two goods, X and Y . There are 6 units of X and 4 units of Y available.

Agent 1 has the utility function $u_1 = \min\{x_1, y_1\}$ and agent 2 has the utility function $u_2 = \min\{x_2, y_2\}$.

An allocation is denoted by $(x_1, y_1), (x_2, y_2)$, where (x_1, y_1) is agent 1's consumption bundle and (x_2, y_2) is agent 2's consumption bundle, and $x_1 + x_2 = 6, y_1 + y_2 = 4$. Which of the following allocations is not Pareto efficient?

[Question ID = 9490]

1. $(2, 2), (4, 2)$
[Option ID = 37957]
2. $(3, 2), (3, 2)$
[Option ID = 37958]
3. $(3, 1), (3, 3)$
[Option ID = 37959]
4. $(1, 2), (5, 2)$
[Option ID = 37960]

24)

Two players are playing the repeated Prisoner's dilemma game. In each period, each player can choose between two actions, C and NC .

In period 1, if both the players choose NC , then each get 2 and the game ends. If one of them chooses NC and the other chooses C , then also the game ends, the former getting 3 and the later getting 1. However if both of them choose C the game goes to period 2.

In period 2, all the payoffs are doubled. For example, if both of them choose NC , each gets 4. Similarly when one of them chooses NC and the other C , the former gets 6 and the later gets 2. If both choose C , then each get 5.

Assume that A and B make their choice simultaneously in both periods and both players have discount factor $\delta = 1$.

How many Nash equilibrium strategy profiles does this game have?

[Question ID = 9491]

1. Only one strategy profile is Nash equilibrium

[Option ID = 37961]

2. Two strategy profiles are Nash equilibrium

[Option ID = 37962]

3. Five strategy profiles are Nash equilibrium

[Option ID = 37963]

4. There is no Nash equilibrium

[Option ID = 37964]

25)

Two players A and B are playing the matching coin game. A can choose between 'Head' or 'Tail' while B can choose between 'Head', 'Tail' and 'Skip'.

If both choose 'Head' or both choose 'Tail' then A receives Rs. 5 and B receives 0. On the other hand if one chooses 'Head' and the other chooses 'Tail' then B receives Rs. 5 and A receives 0. B can earn a fixed payment 2 by choosing 'Skip'.

In that case A earns Rs. 10 for 'Head' and 0 for 'Tail'. Suppose that A and B choose simultaneously. How many mixed strategy Nash equilibrium does this game have?

[Question ID = 9492]

1. None [Option ID = 37965]

2. 1

[Option ID = 37966]

3. 2

[Option ID = 37967]

4. 3

[Option ID = 37968]

26) Which of the following is an example of asymmetric information game?[Question ID = 9493]

1. Chess [Option ID = 37969]
2. Matching coin game [Option ID = 37970]
3. An IPL auction where all bidders are equally informed about the ability and availability of a player [Option ID = 37971]
4. Bargaining between a lender and an unknown borrower [Option ID = 37972]

27)

There are two polluting soft drinks plants by the lake. Both firms can reduce pollution by treating effluent.

Cost of effluent treatment for Plant A is given by $C_A(q_A) = q_A^2 + 10q_A$ where q_A is the reduction in effluent released by Plant A . Cost of Plant B is given by $C_B(q_B) = \frac{3q_B^2}{4}$; q_B is the reduction of effluent released by Plant B .

Health benefits from effluent reduction is $\frac{1}{2}(q_A + q_B)^2$. Suppose that the government wants total 16 units reduction in effluent. What is the most efficient allocation of q_A and q_B ?

[Question ID = 9494]

1. Plant A should reduce the entire 16 units.

[Option ID = 37973]

2. Plant A should reduce 4 units and Plant B the remaining amount.

[Option ID = 37974]

3. Plant A should reduce 10 units and Plant B the remaining amount.

[Option ID = 37975]

4. Plant **B** should reduce the entire **16** units.

[Option ID = 37976]

28)

A student has the opportunity to take a test at most thrice. The student knows that each time he takes the test, his score is an independent random draw from the uniform distribution on the interval $[0, 100]$ (all real values possible).

After learning his score on a test, the student can either stop and accept it as his official score, or he can discard the result and retake the test.

If the student rejects his score twice and takes the test a third time, that score will be his official score.

Retest carries a penalty - if one scores x in a retest it is considered as $0.8x$. If his objective is to maximize his expected official score, the student will decide to be retested after the very first test if and only if his score is less than:

[Question ID = 9495]

1. **46.4**

[Option ID = 37977]

2. **49.2**

[Option ID = 37978]

3. **50**

[Option ID = 37979]

4. **62.5**

[Option ID = 37980]

29)

Consider a two-good two-agents exchange economy. Goods are indexed by X and Y , while agents are indexed by 1 and 2.

Utility functions are $u_1(x, y) = x + 2y$ and $u_2(x, y) = x + y$. Social endowment is **10** units of good X and **10** units of good Y . Consider the following allocation. Agent 1 gets **5** units of good Y ;

agent 2 gets **5** units of good Y and **10** units of good X . Find the prices, which can sustain the above allocation as market equilibrium? Let p_X and p_Y be the prices of good X and good Y respectively.

[Question ID = 9496]

1. $p_X = 1, p_Y = 2$

[Option ID = 37981]

2. $p_X = 2, p_Y = 2$

[Option ID = 37982]

3. $p_X = 3, p_Y = 2$

[Option ID = 37983]

4. $p_X = 4, p_Y = 2$

[Option ID = 37984]

30)

Suppose a seller has a product which can be of quality H (high) or quality L. There is a buyer who values H at v_H and L at v_L but can not distinguish between H and L without consuming it. However, the buyer knows that H occurs with probability p and L with $(1 - p)$. Assume $v_H > v_L$.

The seller has a choice to advertise, which costs c (if she chooses not to advertise, then she does not have to pay c). Assume that the buyer always pays his true valuation. Find a condition under which the seller advertises irrespective of the quality of her product in equilibrium (Perfect Bayesian Equilibrium).

[Question ID = 9497]

1. $c \leq (v_H - v_L)$

[Option ID = 37985]

2. $c \leq (1 - 2p)(v_H - v_L)$

[Option ID = 37986]

3. $c \leq p(v_H - v_L)$

[Option ID = 37987]

4. $c \leq (1 - p)(v_H - v_L)$

[Option ID = 37988]

31)

Consider the hypothetical economy with aggregate production function given by $F(L, K) = L^{2/3} K^{1/3}$, and 10% annual rate of depreciation (L, K denote labour and capital respectively).

If the rate of savings in this economy is 20%, then the steady state level of capital stock per capita is

[Question ID = 9498]

1. 2

[Option ID = 37989]

2. $\sqrt{2}$

[Option ID = 37990]

3. $2\sqrt{2}$

[Option ID = 37991]

4. $\frac{1}{2}$

[Option ID = 37992]

32) If an aggregate production function is given by $Y = AK^\theta L^{1-\theta}$, then find the labour and capital shares of income.

Notation: L, K denote labour and capital respectively, A is total factor productivity, Y is aggregate output.

[Question ID = 9499]

1. Labour Share $\frac{1}{1-\theta}$, Capital Share $\frac{1}{\theta}$

[Option ID = 37993]

2. Labour Share $\frac{1}{\theta}$, Capital Share $\frac{1}{1-\theta}$

[Option ID = 37994]

3. Labour Share $1 - \theta$, Capital Share θ

[Option ID = 37995]

4. Labour Share θ , Capital Share $1 - \theta$

[Option ID = 37996]

33)

A rural landowner can deposit his savings in a commercial bank and receive an annual interest rate of 20%. Alternatively he can lend to villagers who need credit. Assume that all loans are of the same size and only 60% of them are repaid. Find the interest rate that would make his earnings the same as from depositing his savings in a bank.

[Question ID = 9500]

1. 20%

[Option ID = 37997]

2. 70%

[Option ID = 37998]

3. 85%

[Option ID = 37999]

4. 100%

[Option ID = 38000]

34)

A Social Planner wants to maximize $\sum_{t=0}^{\infty} \beta^t u(c_t)$

subject to $c_t + k_{t+1} = Ak_t^\alpha + (1 - \delta)k_t$, $t = 0, 1, 2, \dots$,

where c_t and k_t refer to consumption and capital stock at time t . Note that $c_t, k_{t+1} \geq 0$ and k_0 is exogenous. The discount factor is $0 < \beta < 1$. Standard assumptions on the utility function $u(c)$ hold so that the optimal path is characterized by interior Euler equations. Assume the economy is in steady state. Suppose there is a one-shot increase in A .

Consider the following statements:

Statement I: Capital will rise in the new steady state.

Statement II: Consumption *may* drop in the short run, but will rise in the new steady state.

Choose the **correct** answer from the options given below

[Question ID = 9501]

1. Both Statement I and Statement II are true

[Option ID = 38001]

2. Both Statement I and Statement II are false

[Option ID = 38002]

3. Statement I is true but Statement II is false

[Option ID = 38003]

4. Statement I is false but Statement II is true

[Option ID = 38004]

35)

An infinitely-lived agent wants to maximize $\sum_{t=0}^{\infty} \beta^t u(c_t)$

subject to the dynamic budget constraint $A_{t+1} + c_t = w_t + (1+r)A_t$, $t = 0, 1, 2, \dots$,

with positive initial asset level A_0 ; w_t are exogenously specified wages in each time period; c_t is consumption at time t ; $0 < \beta < 1$ is the discount factor; r is the interest rate. The instantaneous utility function $u(c)$ has all the standard properties such that the optimal consumption path is characterized by interior Euler equations. Let $\beta = 0.9$ and $r = 0.1$. Which of the following statements is true?

[Question ID = 9502]

1. Consumption increases over time.

[Option ID = 38005]

2. Consumption decreases over time.

[Option ID = 38006]

3. Consumption is constant over time.

[Option ID = 38007]

4. Whether consumption increases, decreases or is constant depends on the specific utility function.

[Option ID = 38008]

36)

An infinitely-lived consumer has a cake of size **1** at time $t = 0$. The cake does not spoil over time. The consumer wishes to consume c_t amount of the cake at time t , $t = 0, 1, 2, \dots$, in order to maximize

$$\sum_{t=0}^{\infty} \beta^t \ln(c_t)$$

where $0 < \beta < 1$ is her discount factor. Which of the following must be satisfied by the optimal consumption-saving path at any period t ?

[Question ID = 9503]

1. The current consumption is proportion

$$\beta$$

of the cake left from the last period

[Option ID = 38009]

2. The current consumption is proportion

$$\beta^2$$

of the cake left from the last period

[Option ID = 38010]

3. The current consumption is proportion

$$(1 - \beta)$$

of the cake left from the last period

[Option ID = 38011]

4. The current consumption is proportion

$$(1 - \beta)^2$$

of the cake left from the last period

[Option ID = 38012]

37)

The Phillips curve relation for an economy is given by $\pi_t - \pi_t^e = 0.1 - 3u_t$ where $\pi_t^e = \pi_{t-1}$. Suppose inflation in year $(t - 1)$ is 2 percent. In year t , the central bank decides to keep the unemployment rate at 3 percent forever. Suppose now half of the wage contracts in the economy are linked with inflation. What are the rate of inflation for years $t, t + 1, t + 2$ and $t + 3$?

Notation: Actual rate of inflation at period t is π_t ; expected rate of inflation at period t is π_t^e ; rate of unemployment at period t is u_t .

[Question ID = 9504]

1. 1%, 2%, 3% and 4% respectively

[Option ID = 38013]

2. 4%, 6%, 8% and 10% respectively

[Option ID = 38014]

3. 3%, 4%, 5% and 6% respectively

[Option ID = 38015]

4. 1%, 3%, 5% and 7% respectively

[Option ID = 38016]

38)

A perpetuity offers a Rs. 10 annual coupon, with first payment one year from now. The current rate of interest is 5%. If the rate of interest doubles it would result in

[Question ID = 9505]

1. Price of the perpetuity will be doubled

[Option ID = 38017]

2. Price of the perpetuity will be halved

[Option ID = 38018]

3. A 50% increase in the price of the perpetuity

[Option ID = 38019]

4. A 50% fall in the price of the perpetuity

[Option ID = 38020]

39) Consider a closed economy. Which of the following is correct?

[Question ID = 9506]

1. Both fiscal and monetary policies are effective for unemployment

[Option ID = 38021]

2. Both fiscal and monetary policies are ineffective for unemployment

[Option ID = 38022]

3. Fiscal policy is effective for unemployment and monetary policy is ineffective for unemployment

[Option ID = 38023]

4. Monetary policy is effective for unemployment and fiscal policy is ineffective for unemployment

[Option ID = 38024]

40)

A Social Planner wants to maximize $\sum_{t=0}^{\infty} \beta^t u(c_t)$

subject to $c_t + k_{t+1} = f(k_t) + (1 - \delta)k_t$

where $t = 0, 1, 2, \dots$; $c_t, k_{t+1} \geq 0$; k_0 given. Here c_t and k_t refer to consumption and capital stock at time t , $0 < \delta < 1$ is the rate of depreciation, and standard assumptions on the utility function $u(c)$ and production function $f(k)$ hold, so that the optimal path is characterized by interior Euler equations. If $\delta = 0.1$, $\beta = 0.9$, $f(k) = k^{\frac{1}{3}}$, find the steady-state capital stock k^* .

[Question ID = 9507]

1. k^* depends on the utility function $u(c)$
[Option ID = 38025]
2. k^* depends on the initial capital stock k_0
[Option ID = 38026]
3. $k^* < 1$; it is independent of the utility function and capital stock
[Option ID = 38027]
4. $k^* > 1$; it is independent of the utility function and capital stock
[Option ID = 38028]

41) Suppose in a linear model estimated using time-series data using OLS, there is negative residual autocorrelation. What does it imply?

[Question ID = 9508]

1. There is a cyclical pattern in the residuals
[Option ID = 38029]
2. There is an alternating pattern in the residuals
[Option ID = 38030]
3. The residuals are decreasing over time
[Option ID = 38031]
4. There is a systematic pattern to the residuals but it can be determined only on further inspection.
[Option ID = 38032]

42)

A researcher estimates the demand for rice by regressing quantity of rice (Q) on its price (P), and income (I): $Q_i = \alpha + \beta P_i + \gamma I_i + u_i$. The sample consists of 200 consumers (indexed by i) all over India. The residual sum of squares from this regression is 170. The researcher now wants to test if demand parameters are the same for North and South India. She therefore runs this regression separately for the 100 consumers in the sample in North India, and obtains a residual sum of squares = 80. The regression for the remaining 100 consumers in South India in the sample yields a residual sum of squares of 66. What is the value of the F -test statistic she would obtain?

[Question ID = 9509]

1. 13.5
[Option ID = 38033]
2. 10.7
[Option ID = 38034]
3. 6.7
[Option ID = 38035]
4. There is insufficient information to compute this test.
[Option ID = 38036]

43)

Consider two variables: Y, X with $var(Y) > 0$, $var(X) > 0$. X is the average yearly temperature of all the countries of the world in Fahrenheit while $Y = \frac{-160}{9} + \frac{5X}{9}$, or the average yearly temperature of all the countries of the world in Celsius. Notation: var and cov denote variance and covariance respectively.

Which of the following is true?

[Question ID = 9510]

1. $\frac{cov(Y, X)}{var(X)} = \frac{cov(Y, X)}{var(Y)}$
[Option ID = 38037]
2. $\frac{cov(Y, X)}{var(X)} = \frac{var(Y)}{cov(Y, X)}$
[Option ID = 38038]
3. $\frac{cov(Y, X)}{var(X)} < \frac{var(Y)}{cov(Y, X)}$
[Option ID = 38039]
4. $\frac{cov(Y, X)}{var(X)} > \frac{var(Y)}{cov(Y, X)}$

[Option ID = 38040]

- 44) Consider three variables: Y, X_1, X_2 . Which of the following is true in case of a regression of Y on $X_1, X_2, (X_1 + X_2)$?

[Question ID = 9511]

1. There is a unique solution to the set of coefficients and a unique solution to the Sum of Square of Residuals
[Option ID = 38041]
2. There is a unique solution to the set of coefficients but a non-unique solution to the Sum of Square of Residuals
[Option ID = 38042]
3. There is a non-unique solution to the set of coefficients but a unique solution to the Sum of Square of Residuals
[Option ID = 38043]
4. There is a non-unique solution to the set of coefficients and a non-unique solution to the Sum of Square of Residuals
[Option ID = 38044]

45) Estimation of regression coefficients in presence of high but NOT perfect multicollinearity may result in all of these EXCEPT which of the following:

[Question ID = 9512]

1. Estimates are all Best Linear Unbiased Estimator (BLUE)
[Option ID = 38045]
2. A high Coefficient of determination (R^2)
[Option ID = 38046]
3. Almost all the estimates are statistically significant
[Option ID = 38047]
4. High confidence intervals for the regression estimates
[Option ID = 38048]

- 46) Let $x_1, x_2, \dots, x_n$ i.i.d. from population with probability density function $f(x) = \frac{\lambda}{x^2}; 0 < \lambda \leq x$.
Find the maximum likelihood estimator for λ .

[Question ID = 9513]

1. $\min\{x_1, x_2, \dots, x_n\}$
[Option ID = 38049]
2. $\max\{x_1, x_2, \dots, x_n\}$
[Option ID = 38050]
3. $\sqrt{2\bar{x}}$, where $\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$
[Option ID = 38051]
4. $\sqrt{2\hat{x}}$ where $\hat{x} = \frac{1}{n} \sum_{i=1}^n \frac{1}{x_i}$
[Option ID = 38052]

- 47) Consider a linear model $y_i = \alpha + \beta X_{1i} + \gamma X_{2i} + u_i$ where $E[u_i] = 0$ and $Var[u_i] = \sigma_i^2$, known but not constant. E and Var denote expectation and variance respectively.
Which of the following statements is most correct in this situation?

[Question ID = 9514]

1. Weighted least squares estimation will give zero weight on observations with high variance
[Option ID = 38053]
2. Weighted least squares estimation will give every observation an identical weight
[Option ID = 38054]
3. In weighted least squares, less weight is given to observations with higher variance
[Option ID = 38055]
4. In weighted least squares less weight is given to observations with lower variances
[Option ID = 38056]

- 48) Suppose that a recent study suggests that the number of covid cases detected (C) is related to smoking (X). But we also believe that there is considerable measurement error the number of covid cases detected, but the measurement error is not correlated to the true but unknown

number of covid cases. Given good-quality data on the number cigarettes X are sold in a city every day, the researcher estimates $C_i = \alpha + \beta X_i + \epsilon_i$ using OLS. Which of the following is the best correct response regarding the OLS estimator of β ?

[Question ID = 9515]

1. It is biased and inconsistent because of classical errors in variables.
[Option ID = 38057]
2. It is biased but consistent only if the smokers do not avoid covid-19 test.
[Option ID = 38058]
3. It is unbiased but consistent only if the smokers do not avoid covid-19 test.
[Option ID = 38059]
4. It is unbiased and consistent
[Option ID = 38060]

49)

Consider the regression $Y_i = \alpha + \beta X_i + \epsilon_i$; where X_i is a categorical variable, 0 for male, and 1 for female. Y_i is the monthly income. Suppose there are m observations for males, and f observations for females. Mean monthly income of males and females in our sample are denoted by $\bar{Y}_m$ and $\bar{Y}_f$ respectively. Find the least square estimator of β .

[Question ID = 9516]

1. $\bar{Y}_f - \bar{Y}_m$
[Option ID = 38061]
2. $\frac{\bar{Y}_f}{f} - \frac{\bar{Y}_m}{m}$
[Option ID = 38062]
3. $f\bar{Y}_f - m\bar{Y}_m$
[Option ID = 38063]
4. $\frac{f\bar{Y}_f + m\bar{Y}_m}{f+m}$
[Option ID = 38064]

50)

Consider a hypothesis where the level of income depends on the level of protein intake. We can estimate this using a regression model: $Y_i = \alpha + \beta P_i + \epsilon_i$, where Y_i is level of income and P_i is the protein intake. However, there is a problem in this model as $E[\epsilon|P] \neq 0$ (E stands for expectation). But, we know from a scientific study that the protein intake is high in islands because of fish intake. So, we can first estimate $P_i = \alpha + \beta \text{island}_i + \epsilon_i$, where P_i is the level of protein intake and island_i is a dummy for the country indicating whether it is an island or not. In the second step, we can use estimated values of protein and estimate our required model. We know that the mean income for island and non-island countries are 5000 and 4000, respectively. We also know that the mean protein intake for island and non-island countries are 40 and 20 units, respectively. Find the consistent estimate of β for this model.

[Question ID = 9517]

1. 125
[Option ID = 38065]
2. 200
[Option ID = 38066]
3. 50
[Option ID = 38067]
4. 75
[Option ID = 38068]