Question 1. Suppose Frank can either hunt for birds (b) or forage for wild berries (w) on his isolated island property. He can catch two birds or gather three pounds of berries in an hour. He only has 12 hours a week to devote to these activities. His utility function for birds and berries is $u(w,b) = bw^{0.5}$. What is the slope of his production possibilities frontier?

(a) 3/2
(b) -3/2
(c) 2/3
(d) -2/3

Question 2. Suppose Frank can either hunt for birds (b) or forage for wild berries (w) on his isolated island property. He can catch two birds or gather three pounds of berries in an hour. He only has 12 hours a week to devote to these activities. His utility function for birds and berries is $u(w,b) = bw^{0.5}$. Which point is not Pareto efficient?

(a) (0, 24)
(b) (3, 21)
(c) (9, 18)
(d) (12, 16)

Question 3. Strategy A has an expected value of 10 and a standard deviation of 3. Strategy B has an expected value of 10 and a standard deviation of 5. Strategy C has an expected value of 15 and a standard deviation of 10. Which one of the following statements is true?

(a) A risk averse decision maker will always prefer A to B, but may prefer C to A.
(b) A risk neutral decision maker will always prefer C to A or B.
(c) A risk seeking decision maker will always prefer C to A or B.
(d) All of the above are correct.

Question 4. The saddle point in a payoff matrix is always the

(a) largest number in the matrix.
(b) smallest number in its column and the smallest number in its row.
(c) smallest number in the matrix.
(d) largest number in its column and the smallest number in its row.

Question 5. Consider the game below. Given that p is the probability that Player 1 will choose N and q is the probability Player 2 will choose Y, which of the following is a pure strategy Nash equilibrium?

		Player 2	
		Y	Z
Player 1	N	1,5	0,0
	M	0,0	5,1

(a) p=0 and q=0
(b) p=1 and q=0
(c) p=0 and q=1
(d) p=0.5 and q=0.5

Question 6. The Nintari Company produces video game playing machines and a second firm, Necsega, owns exclusive rights to manufacture games that can be used with the Nintari game machine. Both of these imperfectly competitive firms are maximizing profits. If Nintari buys Necsega and nothing else changes, then profits will be maximized if Nintari

(a) decreases the prices of game machines and games.
(b) does not change the prices of game machines or games.
(c) increases the prices of game machines and games.
(a) None of the above is correct.

Question 7. The optimal output of joint products that are produced in fixed proportions is found where

(a) the vertical sum of the marginal revenue from each product is equal to marginal cost.
(b) the horizontal sum of marginal revenue from each product is equal to marginal cost.
(c) the marginal revenue from each product is equal to the marginal cost of producing each product.
(d) the marginal cost is equal to the corresponding price of each product.

Question 8. The optimal combination of joint products that are produced in variable proportions is found where

(a) the marginal revenue from each product is equal to the marginal cost of producing each product.
(b) the isorevenue line is tangent to the product transformation curve.
(c) the isorevenue line is tangent to the relevant total cost curve.
(d) None of the above is correct.

Question 9. A firm has two products and two customers. Customer 1 is willing to pay $9 for Product A and $4 for Product B. Customer 2 is willing to pay $7 for Product A and $5 for Product B. Can the firm increase revenue by bundling and, if so, how much should be charged for the bundle?

(a) The firm cannot increase profits by bundling.
(b) The firm can increase profits by bundling. The bundle should sell for $12.
(c) The firm can increase profits by bundling. The bundle should sell for $10.
(d) The firm can increase profits by bundling. The bundle should sell for $7.

Question 10. An economy has two agents, 1 and 2, and two goods, *x* and *y*. They have utility functions $U_1 = x_1^2 y_1$ and $U_2 = x_2 y_2^2$ respectively, where x_i and y_i denote agent *i*'s consumption of good x and y respectively. Which of the following allocations is Pareto efficient (assume no wastage)?

(a) (x1; y1) = (20; 40), (x2; y2) = (40; 20)
(b) (x1; y1) = (30; 30), (x2; y2) = (30; 30)
(c) (x1; y1) = (40; 20), (x2; y2) = (20; 40)
(d) (x1; y1) = (30; 20), (x2; y2) = (30; 40)

Question 11. A profit maximising firm operating in a perfectly competitive market has the cost function $c(q) = 100 + q^2$ for any $q > 0$. If the firm decides to produce $q = 0$, however, its cost is 0. The market price is p. If $p = 40$, the firm's optimum output is

(a) 0
(b) 10
(c) 20
(d) 30

Question 12. A profit maximising firm operating in a perfectly competitive market has the cost function $c(q) = 100 + q^2$ for any $q > 0$. If the firm decides to produce $q = 0$, however, its cost is 0. The market price is p. If $p = 10$, the .firm's optimum output is

(a) 0
(b) 5
(c) 10
(d) 20

Question 13. A firm has an order to supply 20 units of output. It can divide its production across two different plants, 1 and 2, with cost functions $c_1(q_1) = q_1^2$ and $c_2(q_2) = 3q_2^2$, respectively. The total order must be produced, i.e., $q_1 + q_2 = 20$. To meet the total production target at minimum cost, the amount of output the firm should produce in its first plant is

(a) 20 units.
(b) 15 units.
(c) 10 units.
(d) 5 units.

Question 14. A consumer has utility function $u(x_1, x_2) = \min\{2x_1 + x_2 ; x_1 + 2x_2\}$. Her income is y = 100, the prices are $p_1 = 20$ and $p_2 = 30$. The amount of x_1 in the utility maximizing bundle is

(a) 7
(b) 5
(c) 2
(d) 0

Question 15. A consumer spends Rs. 100 on only two goods, A and B. Assume non satiation, i.e., more of any good is preferred to less. Suppose the price of B is fixed at Rs. 20. When the price of A is Rs. 10, the consumer buys 3 units of B. When the price of A is Rs. 20, she buys 5 units of A. From this we can conclude that for the relevant price range

(a) A is an inferior good.
(b) B is a complement of A.
(c) A is a Giffen good.
(d) All of the above.

Question 16. Consider a firm using two inputs to produce its output. It is known that greater use of both inputs increases output. Moreover, for any combination of positive input prices, the firm employs an input combination of the form (x, y=αx) where $\alpha > 0$ is a constant. Which of the following functions represents this firm's technology?

(a) $f(x, y) = \min\{x^\alpha, y\}$
(b) $f(x, y) = \min\{\alpha x, y\}$
(c) $f(x, y) = \min\{x, \alpha y\}$
(d) $f(x, y) = \min\{x, y^\alpha\}$

Question 17. Consider a duopoly market in which both firms choose quantities. Suppose we have the reaction curve of each firm, i.e., the curve that yields the firm's optimal quantity choice in response to a quantity chosen by the other firm. If one firm is the Stackelberg leader and the other is the Stackelberg follower, then which of the following conditions characterises the quantity chosen by the leader?

(a) The quantity at which the leader's isoprofit curve is tangential to the follower's reaction curve.
(b) The quantity at which the follower's isoprofit curve is tangential to the leader's reaction curve.
(c) The quantity where the leader's isoprofit curve attains a maximum.
(d) The quantity where the two reaction curves intersect.

Question 18. A society has 3 individuals and 3 alternatives A, B and C. Individuals 1 and 2 strictly prefer A to B and B to C. Individual 3 strictly prefers C to B and B to A. A Rawlsian social planner would therefore choose

(a) A.
(b) B.
(c) C.
(d) A or C.

Question 19. Sania and Saina are bargaining over how to split 10 rupees. Both claimants simultaneously name shares they would like to have, s_1 and s_2, where $0 \leq s_1, s_2 \leq 10$. If $s_1 + s_2 \leq 10$ then the claimants receive the shares they name, otherwise both receive zero. Find **all** pure strategy Nash equilibria of this game.

(a) $s_1 = 5, s_2 = 5$
(b) $\{(s_1, s_2) \mid s_1 + s_2 = 10\}$
(c) $\{(s_1, s_2) \mid s_1 + s_2 \leq 10\}$
(d) There is no pure strategy Nash equilibria.

Question 20. Consider the following two-player game. The players simultaneously draw one sample each from a continuous random variable X, which follows *Uniform*[0,100]. After observing the value of her own sample, which is private information (that is, the opponent does not observe it), players simultaneously and independently choose one of the following: SWAP, RETAIN. If both the players choose SWAP then they exchange their initially drawn numbers. Otherwise if at least one person chooses RETAIN both of them retain their numbers. A player earns as many rupees as the number she is holding at the end of the game. Find the probability that the players will exchange their initially drawn numbers.

(a) 1
(b) ½

(c) ⅓
(d) 0

Question 21. For the real-valued function $f(x) = x^4 - 4x^3 + 6x^2 - 4x + 1$, defined for all real numbers x), the point $x = 1$ is

(a) a local minimum.
(b) a local maximum.
(c) a point of inflection.
(d) none of the above.

Question 22. Consider the function f mapping points of the plane into the plane defined by $f(x, y) = (x - y, x + y)$. The range of this function is

(a) the 45 degree line.
(b) a ray through the origin but not the 45 degree line.
(c) the entire plane**.**
(d) the first and third quadrants.

Question 23. Suppose $\{v_1, v_2, \ldots, v_n\}$ is a set of linearly dependent vectors, none of them being the zero vector. Suppose $c_1, c_2, \ldots, c_n$ are scalars, not all zero, such that $\sum_{i=1}^{n} c_i v_i = 0$. Then the minimum number of non-zero scalars is

(a) 1
(b) 2
(c) $n - 1$
(d) Cannot be determined.

Question 24. Suppose the non-zero $n \times 1$ column vector x solves the system of equations $Ax = b$, where A is a $m \times n$ matrix whose columns are the vectors $a_1, a_2, \ldots, a_n$, and b is a $m \times 1$ column vector. Then the set of vectors $\{a_1, a_2, \ldots, a_n, b\}$ is

(a) linearly independent.
(b) linearly dependent.
(c) linearly dependent only if $a_1, a_2, \ldots, a_n$ are linearly dependent.
(d) linearly dependent only if $m = n$.

Question 25. For a system of linear equations $Ax = b$ with m equations and n variables where $m > n$ and b is a given vector, the following is true.

(a) It can never have a unique solution.
(b) It always has at least one solution.
(c) It has at least a one-dimensional solution space.
(d) If $Rank(A) = n$ and a solution exists it must be unique.

Question 26. Suppose a real valued function f is defined for all real numbers except 0, and satisfies the following condition: $f(xy) = f(x) + f(y)$ for all x, y in the domain. Consider the statements:

$f(1) = f(-1) = 0$ - (i)

$f(x) = f(-x)$ for every x - (ii)

(a) (i) is true and (ii) is false.
(b) (i) is false and (ii) is true.
(c) Both are true.
(d) Both are false.

Question 27. The closest point on the parabola $y = \frac{1}{4}x^2$ from a given point (0, b) on the vertical axis, with $b > 0$, is the origin if and only if

(a) $b < 3$
(b) $b > 3$
(c) $b < 2$
(d) $b > 2$

Question 28. Suppose A and B are square matrices that satisfy $AB + BA = 0$, where **0** is a square matrix of zeros. Then it must be that

(a) $A^2B^3 = B^3A^2$
(b) $A^2B^3 = B^2A^3$
(c) $A^2B^3 = BA^4$
(d) None of the above is necessarily true.

Question 29. An $n - gon$ is a regular polygon with n equal sides. Find the number of diagonals (edges of an $n - gon$ are not considered as diagonals) of a $10 - gon$.

(a) 20 diagonals
(b) 25 diagonals
(c) 35 diagonals
(d) 45 diagonals

Question 30. The equation $x^7 = x + 1$

(a) has no real solution.
(b) has no positive real solution.
(c) has a real solution in the interval (0, 2).
(d) has a real solution but not within (0, 2).

Question 31. You have 100 observations on y (average value 15) and on x (average value 8) and and from an OLS regression have estimated the slope on x to be 2. Your estimate of the mean of y conditioned on x is

(a) 15
(b) 16
(c) 17
(d) None of the above

Question 32. Suppose you have a random sample of 100 observations on a variable x which is distributed normally with mean 14 and variance 8. The sample average, xbar, is 15 and the sample variance is 7. Then the mean and variance of the sampling distribution of xbar is
(a) 15 and 7, respectively
(b) 15 and 0.07, respectively
(c) 14 and 8, respectively
(d) 14 and 0.08, respectively

Question 33. Suppose you have programmed a computer as follows:
(i) Draw 50 values of a random variable X from a distribution that is Uniform between 10 and 20.
(ii) Count the number ‘g’ of values of X that are greater than 18.
(iii) Divide ‘g’ by 50 to get ‘h’.
(iv) Repeat this procedure to get 1000 ‘h’ values.
(v) Calculate the average of these 1000 ‘h’ values.

This average should approximately be
(a) 0.1
(b) 0.2
(c) 2
(d) 1

Question 34. Suppose you estimate the following equation using ordinary least squares:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3(3X_2 - 2X_1) + \beta_4 X_1 X_2 + \varepsilon$$

Which of the following statements is true?
(a) It is possible to estimate β_0, β_1, β_2 and β_4 but not β_3.
(b) It is possible to estimate β_0, β_1, β_2 and β_3 but not β_4.
(c) It is possible to estimate β_0 and β_4 but not β_1, β_2 and β_3.
(d) All the parameters can be estimated.

Question 35. Sunita wants to estimate the marginal productivity of labour and runs a regression: $\ln Y = \beta_0 + \beta_1 \ln L + \varepsilon$ using ordinary least squares where Y refers to ouput, L refers to labour, and ln refers to the natural logarithm. The production of Y also needs capital, where labour are capital are substitutes and also higher use of capital means higher output. Sunita, however, does not have information on capital use. By ignoring the role of capital which of the following is true?

(a) The estimated β_1 will have upward bias (higher than what it should be).
(b) The estimated β_1 will have downward bias (lower than what it should be).
(c) The estimated β_1 will be biased but it is not possible to determine the direction of bias.
(d) The estimated β_1 will be unbiased.

Question 36. A friend tells you her multiple regression has a very high R square but all the coefficients of the regression slopes are insignificantly different from zero on the basis of t-tests of significance. This has probably happened because
(a) the intercept has been omitted.
(b) explanatory variables are highly orthogonal.
(c) explanatory variables are highly collinear.
(d) the dependent variable does not vary by much.

Question 37. You estimate the multiple regression Y = a+b1(X1) +b2(X2) +u with a large sample. Let t1 be the test statistic for testing the null hypothesis b1 = 0 and t2 be the test statistic for testing the null hypothesis b2 = 0. Suppose you test the joint null hypothesis that b1 = b2 = 0 using the principle 'reject the null if either t1 or t2 exceeds 1.96 in absolute value', taking t1 and t2 to be independently distributed.
(a) The probability of Type I error is 5 percent in this case.
(b) The probability of Type I error is more than 5 percent but less than 10 percent in this case.
(c) The probability of Type I error is less than or equal to 5 percent in this case.
(d) The probability of Type I error is less than 5 percent in this case.

Question 38. Which of the following are plausible approaches to dealing with a model that exhibits heteroscedasticity?
(a) Take logarithms of each of the variables.
(b) Add lagged values of the variables to the regression equation.
(c) Neither (a) not (b).
(d) Both (a) and (b).

Question 39. Suppose the net cost of undertaking a venture is rupees 1800 if beta $\leq$ 1 and the net profit is rupees Q if beta is greater than 1. Your posterior distribution of beta is normal with mean 2.28 and variance unity. Any value of Q bigger than what number entices you to take this venture? Note that the critical values (z) corresponding to the following tail areas (alpha) under a standard normal are: alpha=0.10 then z=1.28; alpha=0.05 then z=1.645; alpha=0.025 then z=1.96; alpha=0.01 then z=2.33
(a) 100
(b) 200
(c) 300

(d) 450

Question 40. Suppose you are a Bayesian and your posterior distribution for next month's unemployment rate is a normal distribution with mean 8.0 and variance 0.25. If this month's unemployment rate is 8.1%, what would you say is the probability that unemployment will increase from this month to the next month?

(a) 50%
(b) 42%
(c) 5%
(d) 2.3%

Question 41. Consider an otherwise Solovian economy with one exception: the production function does not exhibit decreasing marginal returns with respect to capital. In this case, which of the following statement is **NOT** true?

(a) An increase in the rate of saving could lead to a permanent increase in the rate of growth of per capita income.
(b) An increase in the rate of growth of population could lead to a permanent decrease in the rate of growth of per capita income.
(c) The economy would grow perpetually over time and the capital -labour ratio will not converge to a unique steady state.
(d) Per capita consumption would remain constant over time.

Question 42. Assume that an economy has the following production, saving, labour growth functions and the equation of motions with usual meanings and notations:

$$Y_t = B\,K_t^{\alpha} L_t^{1-\alpha}$$
$$I_t \equiv S_t = sY_t$$
$$K_{t+1} = (1-\delta)K_t + I_t$$
$$L_{t+1} = (1+n)L_t$$

Given this environment (where small case letters represent per capita values) the steady state is characterised by

(a) $y^* = k^* = \left(\frac{Bs}{n+\delta}\right)^{\frac{1}{1-\alpha}}$
(b) $k^* = \left(\frac{Bs}{n+\delta}\right)^{\frac{1}{1-\alpha}}$ & $y^* = B\left(\frac{Bs}{n+\delta}\right)^{\frac{1}{1-\alpha}}$
(c) $k^* = \left(\frac{Bs}{n+\delta}\right)^{\frac{1}{1-\alpha}}$ & $y^* = B\left(\frac{Bs}{n+\delta}\right)^{\frac{\alpha}{1-\alpha}}$
(d) $k^* = \left(\frac{Bs}{n+\delta}\right)^{\frac{1}{1-\alpha}}$ & $y^* = 0$

Question 43. Assume that wages and prices are determined in the labour market using the following functions:

$$W = P^e F(u); F_u < 0$$
$$P = (1 + \mu)W$$

where $u \equiv \frac{N-L}{N}$ represents the unemployment rate. Suppose that one unit of labour produces one unit of output (Y), then

(a) $Y \uparrow \Rightarrow W \uparrow \,\&\, P \uparrow$

(b) $Y \uparrow \Rightarrow W \uparrow \,\&\, P \downarrow$

(c) $Y \uparrow \Rightarrow W \downarrow \,\&\, P \uparrow$

(d) $Y \uparrow \Rightarrow W \downarrow \,\&\, P \downarrow$

Question 44. A representative consumer's planning horizon is divided into two periods – the present (period 1) and the future (period 2). The lifetime utility function is $U = u(c_1) + \frac{u(c_2)}{1+\rho}$. Assume that $u(c_t) = \frac{(C)^{\sigma-1}}{\sigma-1}; \sigma > 1$ and $MRS(c_2\!:c_1) = 1 + r$. Suppose $r = \rho$. Then which of the following statement is true?

(a) $c_1 > c_2$
(b) $c_1 < c_2$
(c) $c_1 = c_2$
(d) None of the above.

Question 45. Assume that aggregate production of an economy is $Y_t = \sqrt{K_t L_t}$ where $K_{t+1} = (1 - \delta)K_t + I_t$, $S_t = sY_t$ and $L_t = 1$. The steady state capital stock at which consumption is maximised is given by:

(a) $\left(\frac{1}{\delta}\right)^2$

(b) $\left(\frac{s}{\delta}\right)^2$

(c) $\sqrt{\frac{s}{\delta}}$

(d) $\left(\frac{1}{2\delta}\right)^2$

Question 46. The *J* curve describes the following phenomenon:

(a) A change in nominal exchange rates will affect relative prices only in the short run but the effect will peter out in the long run.
(b) Depreciation of the domestic currency will worsen the trade balance in the short run but will then gradually improve later as volume effects come to dominate.

(c) An appreciation of the domestic currency will always worsen the trade balance.
(d) An increase in price level will reduce the aggregate demand only in the short but the effect will peter out in the long run.

Question 47. Given below are the equations that characterise an economy in the short term.

Y=C+I+G
C=1000+0.8(Y-T)
I=1500
G=2000
T=1000

A reduction in lump sum taxes from 1000 to 500 will have the following effect on equilibrium output:

(a) it will increase by 2500 units.
(b) it will increase by 2000 units.
(c) it will increase by 1000 units.
(d) it will increase by 500 units.

Question 48. Suppose the following equation holds for an economy at every time *t*:

$$P_t = (1 + a)\frac{W_t N_t}{Y_t}$$

That is, the price of output is a fixed mark-up over unit labour cost where P_t is the nominal price level, W_t is the nominal wage rate, N_t is employment and Y_t is output. Let π be the inflation rate, ω be the wage inflation rate, and λ be the rate of growth in labour productivity $(\frac{Y_t}{N_t})$. Which of the following is true?

(a) $\omega = \pi - \lambda$
(b) $\pi = \omega + \lambda$
(c) $\pi = \omega - \lambda$
(d) $\omega = \lambda - \pi$

Question 49. Suppose the government follows interest rate targeting accompanied by an accommodating monetary policy such that it always supplies whatever amount nominal money is demanded so as to keep the interest rate fixed at $\bar{r}$. In this case,

(a) The LM curve is vertical.
(b) The LM curve is horizontal.
(c) The LM curve is downward sloping.
(d) There does not exist any money market equilibrating relationship between interest rate and income.

Question 50. Conditional convergence hypothesis states that

(a) poorer countries will always grow faster than richer countries.
(b) poorer countries will always grow slower than richer countries.
(c) a country will grow faster the further away it is from its own steady state.
(d) a country will grow slower the further away it is from its own steady state.