

# econQuiz 4

## Detailed Solution Manual

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### Section A: Easy

1. What happens to the IS curve, if the marginal product of capital increases?

- (a) IS curve becomes flatter
- (b) IS curve shifts right
- (c) IS curve shifts left
- (d) IS curve becomes steeper

**Correct option: b**

The IS curve represents all combinations of income (Y) and the real interest rate (r) such that the market for goods and services is in equilibrium. In the short run as the marginal product of capital increases, the desired investment level also increases, which causes the investment schedule to shift rightward. Therefore the IS curve shifts rightward.

2. Share of workforce employed in Indian agriculture according to Agricultural Census in 2011 is about

- (a) 36%
- (b) 49%
- (c) 56%
- (d) 62%

**Correct option: b**

Based on Hyderabad Central University MA Economics 2020 Answer key\*

3. Commodity term of trade is defined as the ratio of

- (a) price index of exports to price index of imports

(b) price index of imports to price index of exports

(c) volume index of exports to volume index of imports

(d) None of the above

**Correct option: a**

Terms of trade are defined as the ratio between the index of export prices and the index of import prices. If the export prices increase more than the import prices, a country has a positive term of trade, as for the same number of exports, it can purchase more imports.

4. Which of the following names is associated with Theory of Entrepreneurship?

- (a) Alfred Marshall
- (b) Ronald Coase
- (c) Joseph Schumpeter
- (d) Graham Pyatt

**Correct option: c**

Joseph Schumpeter stressed the importance of entrepreneurship in capitalism. He popularised the term creative destruction and believed its an "essential fact about capitalism".According to him innovation is the key driver of economy.

5. Economiga is an economy that has a total population of 100; 25 of which are unemployed, and 20 of which are out of the labour force. What is the unemployment rate of the country, Economiga?

- (a) 20%
- (b) 25%
- (c) 45%
- (d) None of the above

**Correct option: d**

The information not explicitly stated is the number employed. To get this number, we should subtract the total population by the 25 unemployed and 20 out of the labour force that is to get 55. Total labour force is the sum of those employed (55) and unemployed (25), which totals to 80. Alternatively, we can calculate total labour force by subtracting total population (100) by the 20 out of the labour force to also arrive at 80. By definition the unemployment rate is the fraction of the labour force unemployed. Dividing 25 by 80 gives 0.235, or 23.5%, which is not one of the choices given above.

**Section B: Medium**

- 6. Rahul spends an income of Rs 200 on only two goods A and B. Suppose the price of A is fixed at Rs 10. When the price of B is Rs 20, Rahul consumed 10 units of A. When the price of B is Rs 25, he buys 8 units of B. From this we can conclude that
  - I. B is an inferior good
  - II. A is a substitute of B
  - III. A is a complement of B
  - IV. B is a giffen good

- (a) I only
- (b) IV & III only
- (c) I & III only
- (d) I ,III, and IV

**Correct option: d**

As we know,

$$P_a \cdot X_a + P_b \cdot X_b = M$$

Case I ( When price of B is Rs 20)

$$\Rightarrow 10 \times 10 + 20 \times X_b = 200$$

$$\therefore X_b = 5$$

Case II ( When price of B is Rs 25)

He purchased 8 quantities of B,

$$\Rightarrow 10 \times 0 + 25 \times 8 = 200$$

$$\therefore X_a = 0$$

From this we can infer the following,

- When  $P_b \uparrow X_b \uparrow$ , therefore B is a giffen good, and all giffen goods are inferior.
- When  $P_b \uparrow X_a \downarrow$ , therefore A is a complement of B.

- 7. If the Incremental capital-output ratio is 6 and the proportion of national income that is invested is 15% then the county's annual growth rate is:

- (a) 25%
- (b) 4%
- (c) 2.5%
- (d) 40%

**Correct option: c**

Incremental Capital-Output Ratio is given by,

$$ICOR = \frac{\text{Annual Investment}}{\text{Annual Increase in GDP}}$$

Here ICOR is given as 6 and Investment is 15%. Let annual growth rate be X.

$$\Rightarrow 6 = \frac{15}{X}$$

$$\therefore X = \frac{15}{6} = 2.5\%$$

- 8. If investment does not depend on the interest rate, then;
  - (a) the IS curve is a vertical line and monetary policy is very effective in raising output.
  - (b) the IS curve is a horizontal line and monetary policy is very effective in raising output.
  - (c) the IS curve is a vertical line and monetary policy does not affect output in the IS-LM model.
  - (d) the IS curve is a horizontal line and monetary policy does not affect output in the IS-LM model.

**Correct option: c**

If investment does not depend on the interest rate, the *IS curve is vertical*. The IS curve represents the relationship between the interest rate and the level of income that arises from equilibrium in the market for goods and services. That is, it describes the combinations of income and the interest rate that satisfy the equation  $Y = C(Y - T) + I(r) + G$ . If investment does not depend on the interest rate, then nothing in the IS equation depends on the interest rate; income must adjust to ensure that the quantity of goods produced, Y, equals the quantity of goods demanded,  $C + I + G$ . Thus, the IS curve is vertical at this level. *Monetary policy has no effect* on output, because the IS curve determines Y. Monetary policy can affect only the interest rate. In contrast, fiscal policy is effective: output increases by the full amount that the IS curve shifts.

- 9. There are a total of 18 balls in a bag. Out of them 6 are red in colour, 4 are green in colour and 8 are blue in colour. If Alan picks three balls randomly from the bag, then what will be the probability that all the three balls are not of the same colour?
  - (a) 92/108
  - (b) 46/51

- (c) 32/43  
 (d) None of the above

**Correct option: b**

Number of ways in which the person can pick three balls out of 18 balls:  $\binom{18}{3} = 816$

Number of ways of picking 3 balls of same colour

$$\binom{6}{3} + \binom{4}{3} + \binom{8}{3} = (20 + 4 + 56) = 80$$

Therefore, required probability = 1 – probability of picking three balls of same colour

$$\begin{aligned} &= 1 - 80/816 \\ &= 736/816 \\ &= 46/51 \end{aligned}$$

10. The Physical Quality of Life Index (PQLI) combines which of the following indicators?
- Life expectancy, Annual Population growth and Infant Mortality
  - Annual Population growth, Life Expectancy and Literacy Rate
  - Annual Population growth, Infant Mortality and Literacy Rate
  - None of the above

**Correct option: d**

None of the above options are correct. The Physical Quality of Life Index (PQLI) primarily is the combined average index of Infant Mortality Rate, Life Expectancy and Literacy Rate.

11. Which of the following would result in a real appreciation of the United States Dollar with respect to the Indian Rupee?
- Increase in Dollar per Rupee nominal exchange rate
  - Increase in Price Index of India
  - Increase in Price Index of United States
  - Any of the above

**Correct option: c**

The exchange rate is the price of foreign money in units of domestic money. If the inflation in the foreign country, not matched by inflation in domestic country, then prices will rise. That is, the domestic currency must appreciate in terms of foreign currency.

12. Wiseman-Peacock hypothesis supports in a much stronger manner the possibility of:
- An upward trend in public expenditure
  - A downward trend in public expenditure
  - A constancy of public expenditure
  - A mixed trend in public expenditure

**Correct option: a**

According to Peacock-Wiseman hypothesis, public expenditure increases over time in a step by step manner based on the three effects- displacement effect, concentration effect and inspection effect.

13. Suppose “money illusion exists” i.e. as prices and income rise proportionately, then people buy more. Which of the following statements about demand should not be true?
- Demand functions are downward sloping
  - Demand functions are homogeneous of degree zero
  - Demand has a positive vertical intercept
  - Demand function are homogeneous of degree one

**Correct option: b**

If money illusion exists, the price change won't be unresponsive to demand change

14. The pre-determined price at which an underlying asset has to be bought or sold is an option contract is called \_\_\_\_\_
- Exercise price
  - Agreed price
  - Strike price
  - None of these

**Correct option: a**

Answer to this question is Exercise Price. But it is often called as Strike Price. Look here to know how we can differentiate them not on the basis of its use but of its technicality.

The exercise price is the price at which an underlying security can be purchased or sold when trading a call or put option, respectively. It is also referred to as the strike price and is known when an investor initiates the trade. An option gets its value from the difference between the fixed exercise price and the market price of the underlying security.

A strike price is the set price at which a derivative contract can be bought or sold when it is exercised. For call options, the strike price is where the security can be bought by the option holder; for put options, the strike price is the price at which the security can be sold.

15. The Solow Model implies that countries with small initial capital stocks should grow rapidly. This implies that:
- Poorer countries should eventually “catch-up” to richer countries (conditional convergence).
  - Poorer countries are bound to experience explosive growth which will propel their economic output far beyond that of rich countries.

- (c) The growth rates between rich and poor countries are bound to diverge.  
 (d) None of the above

**Correct option: a**

For more refer the [materials of Marginal Revolution University](#).

## Section C: Hard

16. Let  $S(n)$  denote the sum of the digits of a positive integer  $n$ . e.g.  $S(178) = 1 + 7 + 8 = 16$ . Then the value of  $S(1) + S(2) + S(3) + \dots + S(99)$  is :
- (a) 476  
 (b) 998  
 (c) 990  
 (d) 900

**Correct option: d**

$S(1) + \dots + S(99)$  means we have to calculate the sum of digits of counting numbers from 1 to 99. From 1 to 99, 1 appears 20 times, 2 appears 20 times, ... 9 appears 20 times (we don't have to bother about zeroes as we have to add) So,

$$\begin{aligned} S(1) + \dots + S(99) &= 20 \times 1 + \dots + 20 \times 9 \\ &= 20(1 + 2 + \dots + 9) \\ &= \frac{20 \times 9 \times 10}{2} \\ &= 900 \end{aligned}$$

17. Consider an economy with perfect capital mobility and fixed exchange rate. Increase in Government expenditure will lead to
- (a) Improvement in trade balance  
 (b) Deterioration in trade balance  
 (c) Trade balance will be achieved  
 (d) No direct influence in trade balance

**Correct option: b**

Under perfect capital mobility and fixed exchange rate, expansionary fiscal policy is completely effective and will lead to rise in income. As income increases, the quantity of import rises which will lead to decline in net exports. Therefore deterioration of trade balance.

18. If correlation between variables  $x$  and  $y$  is zero, then
- (I) The regression of  $y$  on  $x$  and  $x$  on  $y$  passes through  $(\bar{y}, \bar{x})$ .  
 (II) The regression of  $y$  on  $x$  and  $x$  on  $y$  do not pass through  $(\bar{y}, \bar{x})$ .  
 (III) The regression of  $y$  on  $x$  and  $x$  on  $y$  intersects with an angle  $0 < \theta < 90$   
 (IV) The regression of  $y$  on  $x$  and  $x$  on  $y$  will be parallel to each other

- (a) I, III only  
 (b) II, IV only  
 (c) I only  
 (d) IV only

**Correct option: c**

As  $Cor(x, y) = 0$ , From the equation of regression,

- $b_{yx}$  = slope of the regression line of  $y$  on  $x$  which measures the change in variable  $y$  for a unit change in variable  $x$ .
- $b_{xy}$  = slope of the regression line of  $x$  on  $y$  which measures the change in variable  $x$  for a unit change in variable  $y$ .

Here,  $b_{yx} = \frac{r\sigma_y}{\sigma_x}$  and  $b_{xy} = \frac{r\sigma_x}{\sigma_y}$

As  $r = 0$ , both  $b_{yx}$  and  $b_{xy}$  are equal to zero, From the equation of regression.

Regression equation  $y$  on  $x$  :  $y = a + bx$  will change to  $y - \bar{y} = b_{yx}(x - \bar{x})$

Regression equation  $x$  on  $y$  :  $x = a + by$  will change to  $x - \bar{x} = b_{xy}(y - \bar{y})$

From here, it is clear that  $y = \bar{y}$  and  $x = \bar{x}$ , so lines will pass through  $(\bar{y}, \bar{x})$ , perpendicularly.

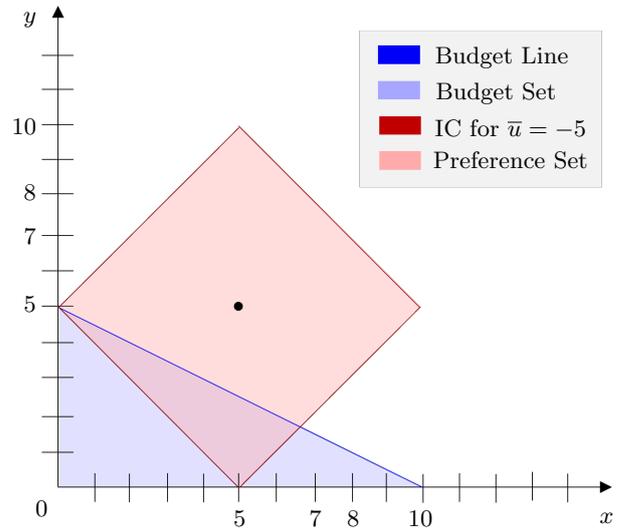
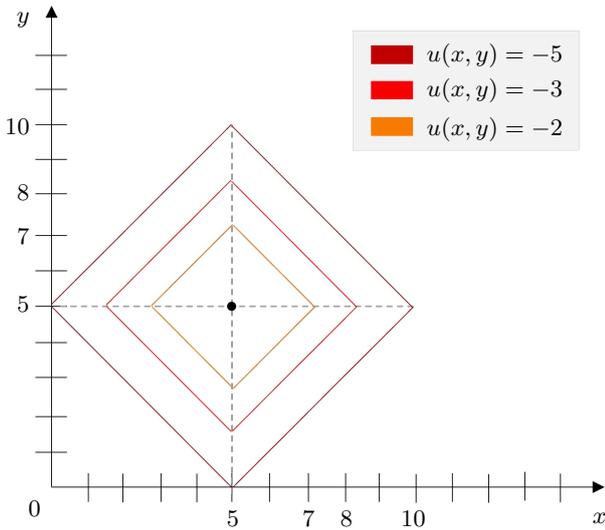
19. Find the optimal bundle for the following problem:

$$\begin{aligned} \max_{x,y} \quad & -|x - 5| - |y - 5| \\ \text{s.t.} \quad & x + 2y \leq 10 \\ & x \geq 0, y \geq 0 \end{aligned}$$

- (a)  $(x, y) = (0, 5)$   
 (b)  $(x, y) = (10, 0)$   
 (c)  $(x, y) = (5, 2.5)$   
 (d)  $(x, y) = (\frac{10}{3}, \frac{10}{3})$

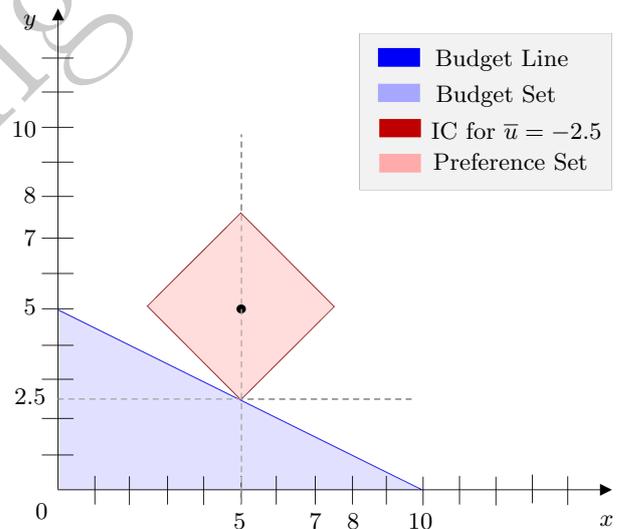
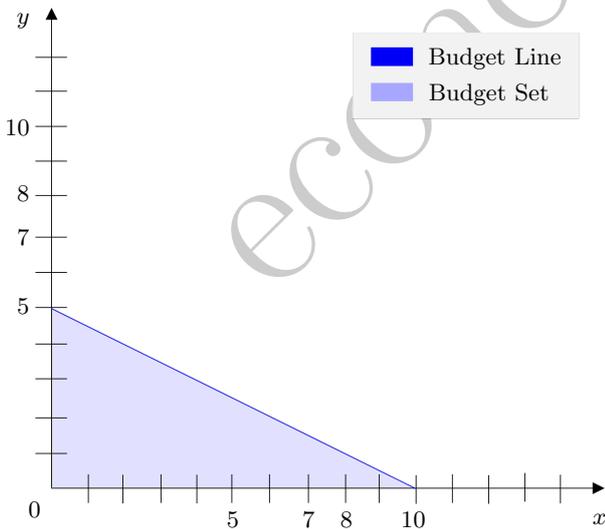
**Correct option: c**

The given utility function produces *diamond-shaped* indifference curves (ICs) with a *bliss-point* at  $(x, y) = (5, 5)$ . Due to this reason, for higher utilities, the ICs shrink towards the point  $(5, 5)$  as shown in figure below.



For this utility function, the maximum utility is obtained at the bliss-point  $(x, y) = (5, 5)$  if there was no restriction in budget. Now since there is a budget constraint  $x + 2y \leq 10$ , we will have to restrict her consumption set (as shown in figure below).

Now as you can observe, there is possibility of improving the utility by just shrinking or scaling down proportionately the diamond IC keeping the *bliss-point* as the midpoint. As shown in the figure below, we finally arrive at a situation where the IC just touches the budget line and is entirely above the budget line.



Since the IC touches the budget line, it means that point also holds for the budget line. i.e, when  $x = 5$  (from figure) we get,

$$\begin{aligned} 5 + 2y &= 10 \\ \Rightarrow 2y &= 5 \\ \therefore y &= 2.5 \end{aligned}$$

Hence the utility maximizing bundle is  $(x, y) = (5, 2.5)$  with utility  $u(5, 2.5) = -2.5$ .

Now let's introduce the IC that represents the utility level  $-5$ .

20. It is exactly 24 hours before *Vinayakan's* mathematics exam. He has an economics exam directly after the mathematics exam and has no time to study in between. *Vinayakan* wants to

be a mathematician, so he places more weight on his mathematics test score. His utility function is given by

$$u(m, e) = 0.6 \ln(m) + 0.4 \ln(e)$$

Where  $m$  is the score on mathematics exam and  $e$  is the score on economics exam. Although he cares more about mathematics, he is better at economics; for each hour spent studying economics he will increase his score by 3 points, but his mathematics score will only increase by 2 points for every hour spent studying mathematics. Studying zero hours results in a score of zero on both subjects [Although  $\ln(0)$  is not defined, assume her utility for a score of zero is negative infinity]. So, how many hours should *Vinayakan* optimally spend studying mathematics?

- (a) 5
- (b) 10
- (c) 9.6
- (d) 14.4

**Correct option: d**

Let  $t_m$  and  $t_e$  be the hours spent by *Vinayakan* studying mathematics and economics respectively. Since total time is 24 hours, we get the first constraint as,

$$t_m + t_e = 24 \quad (1)$$

Now given that,

$$3t_e = e \quad (2)$$

$$2t_m = m \quad (3)$$

Also, we know

$$t_e = 24 - t_m \quad (4)$$

*Vinayakan's* utility maximizing problem is,

$$\begin{aligned} \max_{m,e} & 0.6 \ln(m) + 0.4 \ln(e) \\ \text{s.t.} & t_m + t_e = 24 \end{aligned} \quad (5)$$

By substituting (2), (3) and (4) in (5), we get the new problem as,

$$\max_{t_m} 0.6 \ln(2t_m) + 0.4 \ln(72 - 3t_m) \quad (6)$$

By taking the FOC we get,

$$\begin{aligned} \frac{0.6 \times 2}{2t_m} - \frac{0.4 \times 3}{72 - 3t_m} &= 0 \\ \Rightarrow \frac{1.2}{2t_m} &= \frac{1.2}{72 - 3t_m} \\ \Rightarrow 2t_m &= 72 - 3t_m \\ \Rightarrow 5t_m &= 72 \\ \Rightarrow t_m &= \frac{72}{5} = 14.4 \end{aligned}$$

Hence, we get *Vinayakan's* optimal time spent for economics as  $t_m^* = 14.4$ .