# Urban Economics (7th Edition)

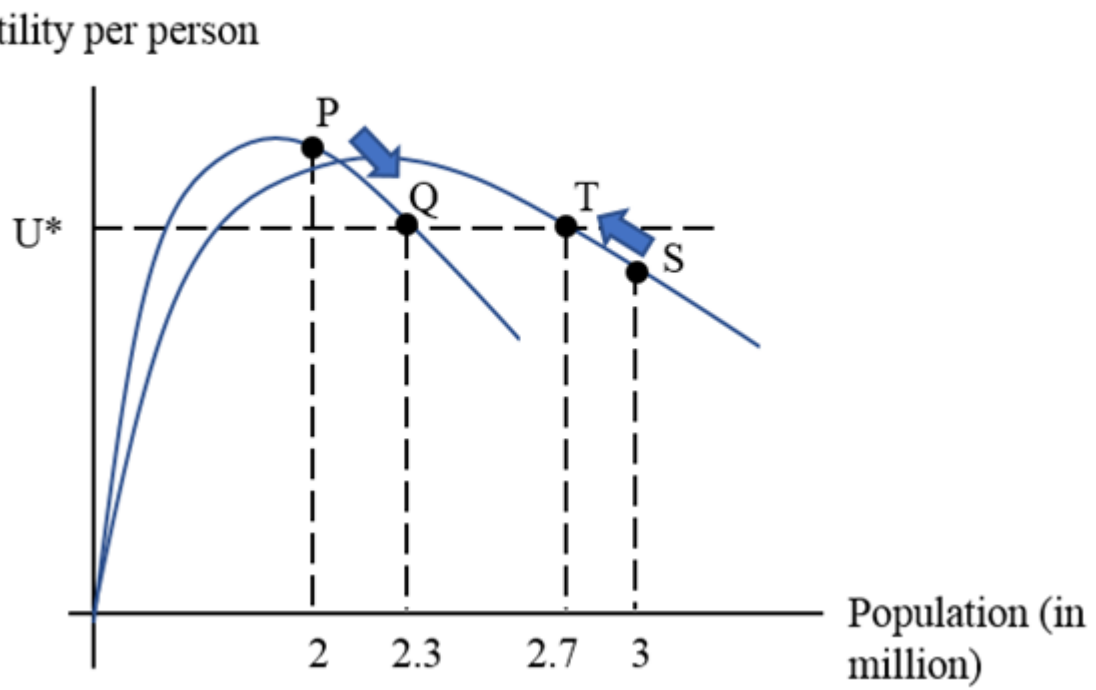
# Chapter 4

All Solutions 1-10

# Problem 1AC

- **Step-by-step solution**
- **Step 1 of 7**
- The size of a city may increase or decrease depending upon the presence or absence of agglomeration economies and diseconomies of scale. In case the agglomeration economies are overwhelmed by the diseconomies of scale, the city size remains small and a migration results towards cities with stronger agglomeration economies.
- **Step 2 of 7**
- a) Figure plots the utility curves for two areas S and P. The utility curve for P lies in the beginning because the population of P is relatively less than that of S. This implies the size of the city is smaller.

Figure 1 Effect of migration on city size

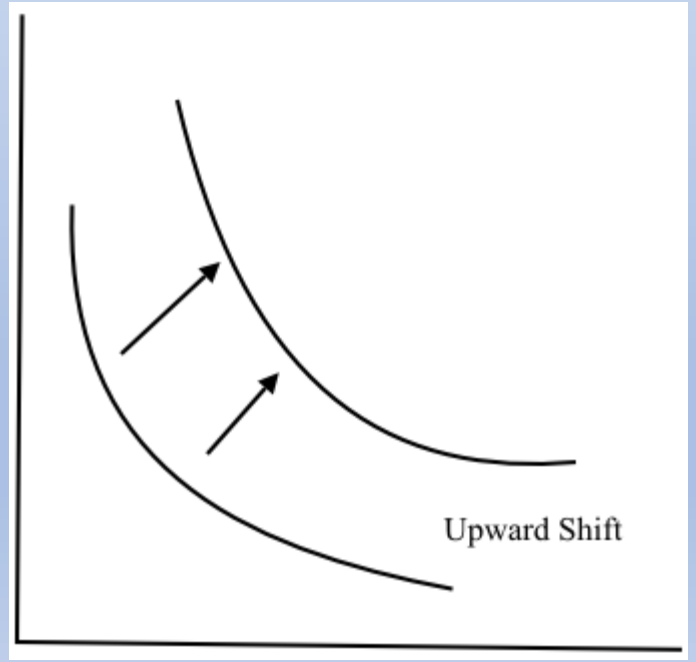



Utility curve for S lies to the extreme right. Initially P has a population of 2 million and it lies at point P on its utility curve. Similarly, S has a population of 3 million and it lies at point S on its utility curve.

- **Step 3 of 7**
- Migration results from S to P so that the utility of each person in P starts falling and that in S starts rising. This movement is shown from point S to point T in region S and from point P to point Q in region P. Hypothetically, the population in P rises and the same in S falls as a result of migration of people from S to P
- **Step 4 of 7**
- b) As mentioned before, it may be possible that the diseconomies of scale start appearing in region P when migration starts from region S. With increased population, there is increased congestion, competition for resources which reduces the utility for each worker in this region.
- Step 5 of 7
- In contrast, agglomeration economies are relatively smaller when population is increasing, perhaps because migrated workers are less productive. Hence, diseconomies of scale from migration dominate the economies of scale from agglomeration. This reduces the utility per person as seen from Figure 1 as a downward movement along the utility curve for P.
- **Step 6 of 7**
- c) Long run equilibrium is a stable equilibrium because there is no tendency for any person to migrate from one city to other. Migration results in providing same utility to each individual in both cities at the long run equilibrium. This is shown in Figure 1. Note that utility for each person in both P and S region is same at U*.
- **Step 7 of 7**
- Migration has increased the population of P from 2 million to an assumed figure of 2.3 million while it reduces the population of region S from 3 million to 2.7 million. Long run equilibrium is shown by points Q in region P and T in region S. Every person among the 2.3 million in P and 2.7 million in S have the same utility U*.

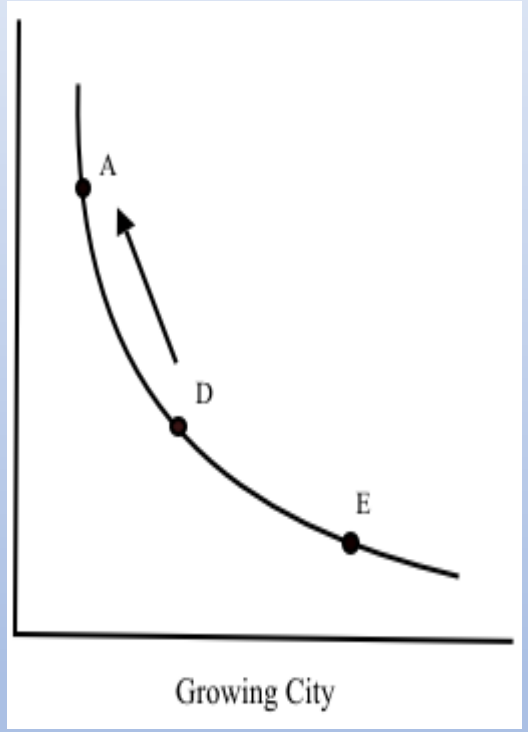
# Problem 2AC

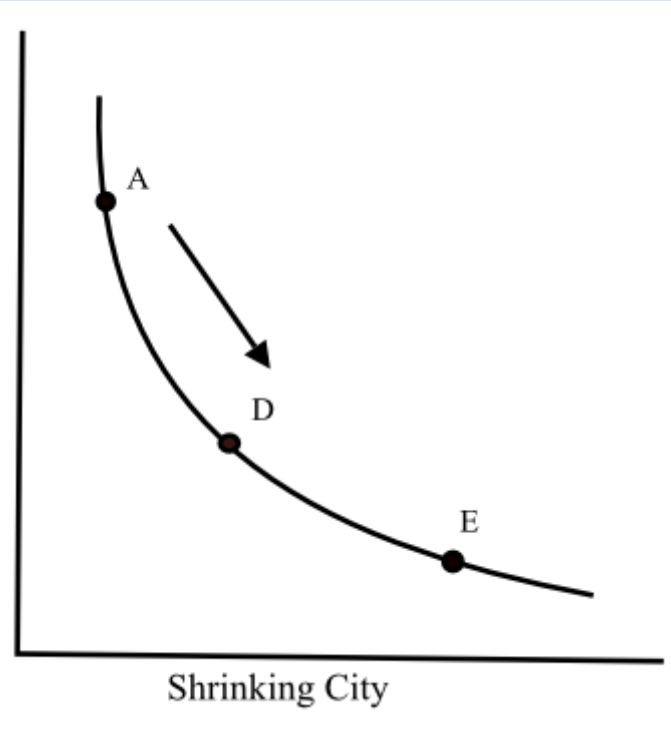
- **Step-by-step solution**
- **Step 1 of 6**
- The initial workforce of the two cities is 3 million. When the Heli Segway replaces the automobile, then the utility maximizing workforce increases to 5 million per city.
- **Step 2 of 6**
- a)
- The urban utility curve in the typical city **shifts upward** because of the utility maximization of the urban workforce with the replacement of Heli- Segway to the automobile, thereby increasing the size of the population to 5 million in each city.
- Consider the following diagram:




The above figure depicts the effect of Heli- Segway on the urban utility curve.

- Step 3 of 6
- b) The workforce of 3 million isn't stable equilibrium because after the automation, the positively sloped part of the equilibrium becomes steeper than the negatively sloped part. The old curve was not as steep as the new one, and hence does not show stable equilibrium.
- **Step 4 of 6**
- c) The following diagrams show the new utility curves:




The growing city moves in the upward direction along the utility curve while the shrinking city moves in the downward direction along the utility curve.

- Step 5 of 6
- d) The new equilibrium of the economy would be at a point where the labor is constant, and the amount of utility is equal in both the cities. Hence, the new equilibrium number of cities is 3 and the city has a population of 5million.

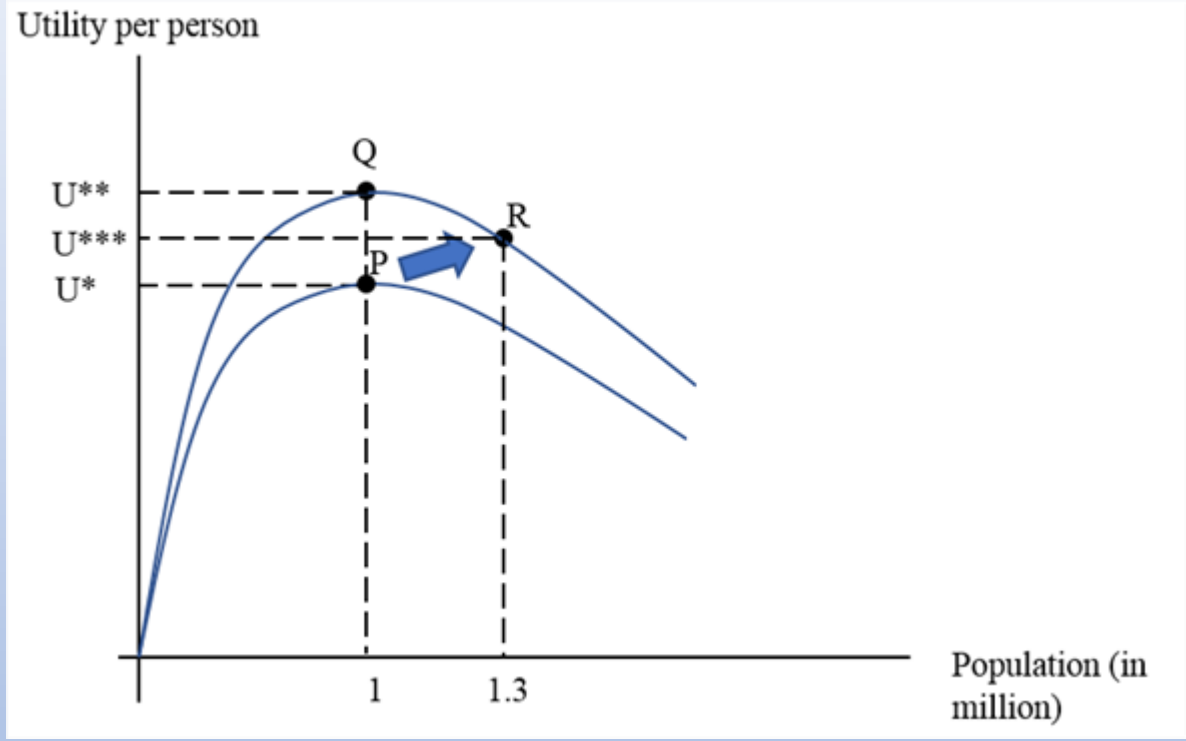
- Step 6 of 6
- Therefore, the replacement of automobiles with Heli Segway increases the utility and the size of the population.

# Problem 3AC

- **Step-by-step solution**
- **Step 1 of 11**
- Cities tend to have a stable equilibrium that lies on the negatively sloped region of the utility curve. This implies that the size of the city cannot be too small when the equilibrium size lies on the positively sloped region of utility curve. A growing city is more productive and this makes migration reinforcing.
- **Step 2 of 11**
- a) City R and City S both have a population of 1 million and this population maximizes the utility. Figure 1 shows the case with city R that has an optimal utility maximized at U* with a population of 1 million shown by point P. When free circuses are announced, the utility of each person in city R increases.

**Step 3 of 11**

This shifts the utility curve upwards in way that the utility maximizing population is still 1 million.




This point is shown Q where utility is maximized at U** at the new utility curve which is higher than the original utility curve.

- Step 4 of 11
- Since free circuses increase the utility of all the people in city R, while making no comparative utility change in city S, people in city S have an incentive to move to city R.
- Step 5 of 11
- b) The difference in two utilities encourage people from city S to migrate to city R which will increase the population of city R. As the utility curve is negatively sloped for a large city size, there is downward movement along the new utility curve. This is shown by point R that has a higher population, assumed to be 1.3 million and a higher utility at U**.
- Step 6 of 11
- Hence, people will migrate from city S to city R because their utility is increased from such migration. Such migration results in increasing the size of city R and shrinking the size of city S.
- Step 7 of 11
- c) As mentioned in part (b), with the introduction of free circuses, everyone in city R experience a higher utility while the population is initially maximizing the utility. People in region S were previously maximizing the utility but now their relative utility is lower. They can increase their utility if they migrate to city R where people are maximizing their utility.
- Step 8 of 11
- Hence, migration will result in decreasing the utility in city R as more and more people are entering the city which moves the utility down from Q to R. Before migration, utility was maximized at 1 million population in city S. Now when population is reduced after migration, utility is reduced.
- Step 9 of 11
- d) Figure 1 shows the new population in city R. With migration being self-reinforcing, the new equilibrium has a higher population in city R. Similarly, the new equilibrium has lower population in city S reducing its size while increasing the size of city R.
- Step 10 of 11
- The new equilibrium is stable because those who have migrated have no incentive to return. The utility they receive per person now is higher than what they were receiving before migration. Similarly, the utility received by existing population of city R, U***, is higher than the utility U* they were receiving before migration.
- Step 11 of 11
- New equilibrium population in both cities is stable. Population in city R is increased and population in city S is decreased.

# Problem 4AC

**Step-by-step solution**

**Step 1 of 3**

The following data is given:

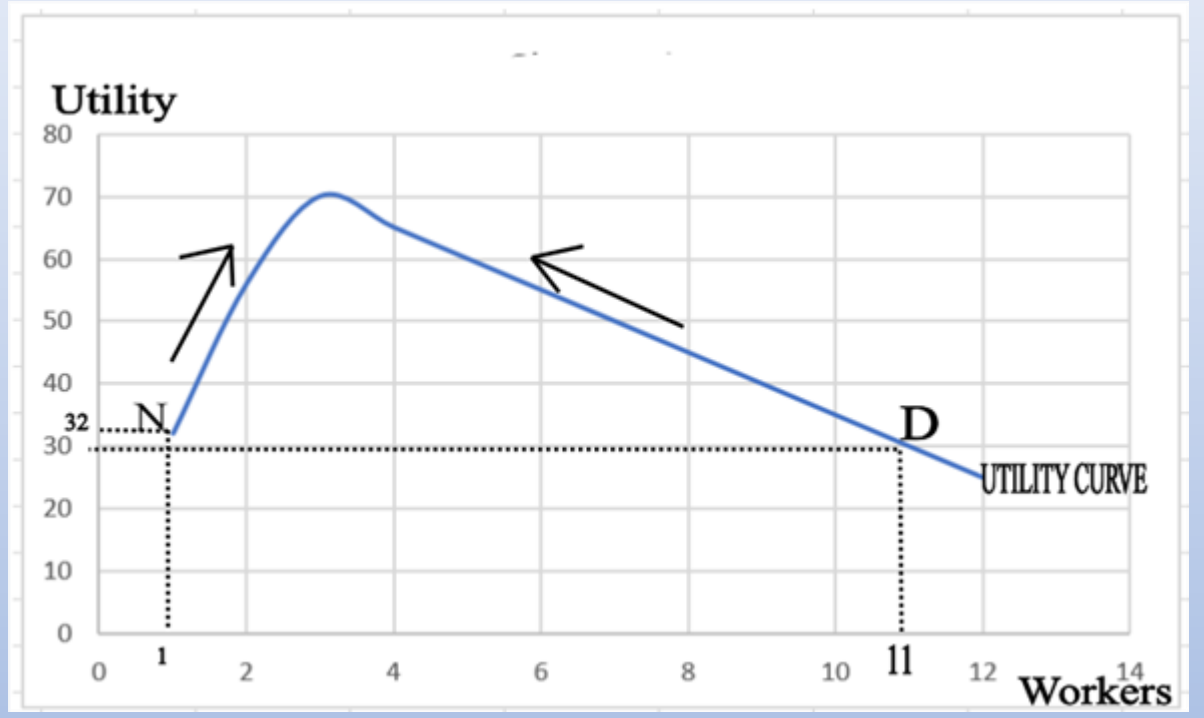
| W | U($) |
|---|---|
| 1 | 32 |
| 2 | 56 |
| 3 | 70 |
| 4 | 65 |
| 5 | 60 |
| 6 | 55 |
| 7 | 50 |
| 8 | 45 |
| 9 | 40 |
| 10 | 35 |
| 11 | 30 |
| 12 | 25 |

Government establishes new city with 1 million workers and 11 million workers live in the old city.

Therefore, the utility in the small new city is **$32** and the utility in the large old city is **$30**.

**Step 2 of 3**

The utility curve is as follows:




Both cities will try to achieve the maximum utility.

**Step 3 of 3**

The economy is in equilibrium when workers have no incentive to move from old city to new city. This is possible only when both cities have same amount of workers.

Therefore, In the long run equilibrium, the workforce of the new city = **6 million** with utility = **$55**; the workforce of the old city = **6 million** with utility = **$55**.

# Problem 5AC

- Step-by-step solution
- Step 1 of 9
- Workers in a different cities face utility curve which shows different levels of utility per worker in accordance with the workforce. The utility curve is steeper in the portion where it is positively sloped and it slops downward for a much higher workforce. A stable equilibrium is achieved only on the negatively sloped portion of the utility curve.
- Step 2 of 9
- a) The large city in the given case has a workforce of 12 million. With the establishment of new city, 1 million workforce is allowed to migrate to the new city. This suggests that the old city has 11 million workforce and new city has 1 million workforce. Right after the establishment of the city, the utilities in two cities are likely to change.
- Step 3 of 9
- The new city has a total of 1 million workforce each receiving a utility of $23. This is the utility received immediately after the government establishing the new city. In contrast, the old city has 11 workforce which implies that each worker is receiving a utility of $30. Since the workers in the new city have a lower utility, migration may not be successful.

- Step 4 of 9
- This is likely to increase the size of the old city and vanish the new city. The new city will shrink in the future, therefore. This is because workers will find that if they migrate to the old city, they would have a greater utility of $25. Thus, it is likely that the large city will grow and new city will shrink.
- Step 5 of 9
- b) Long run equilibrium is considered a stable equilibrium because there is no tendency for workers to migrate further. Hence the self-reinforcing migration ceases and population or workforce is stabilized. This new equilibrium in the old city will be established at 25 million workers.
- Step 6 of 9
- The exact location of the long run equilibrium on the utility function is the number of workers generating maximum utility. However, in this case, new city is not likely to sustain as explained in part a). The movement of 1 million workforce to the new city will be reversed. Hence, the long run equilibrium is 12 million workforce in the old city.
- Step 7 of 9
- c) From the data provided for the old city, when a workforce of 1 million workers migrate from old city to new city, they are receiving a utility of $23. Migration is not successful because the movement from old city to new city is reducing their utility. Hence, movement of 1 million worker is not sustainable for new city.
- Step 8 of 9
- Government should allow the movement of an optimum size of workforce which makes such migration sustainable and not self-correcting. A migration of at least 3 million workforce workforce is likely to be make the new city sustainable in the long run.
- Step 9 of 9
- This is because the new workforce will find their utility at $43 in the new city while the utility in old city is now $40 per worker. Since the utility is higher for the new city, more workers will travel from old city to new city till the new equilibrium at 6 million workforce in each city is determined.

# Problem 6AC

- **Step-by-step solution**
- **Step 1 of 4**
- a) A nation has a workforce of 24 million, which is equally divided between a city and a rural area. The common utility level is $50. The urban and rural utility curves have the conventional hump shape. The two curves are shown in **Figure 1**.

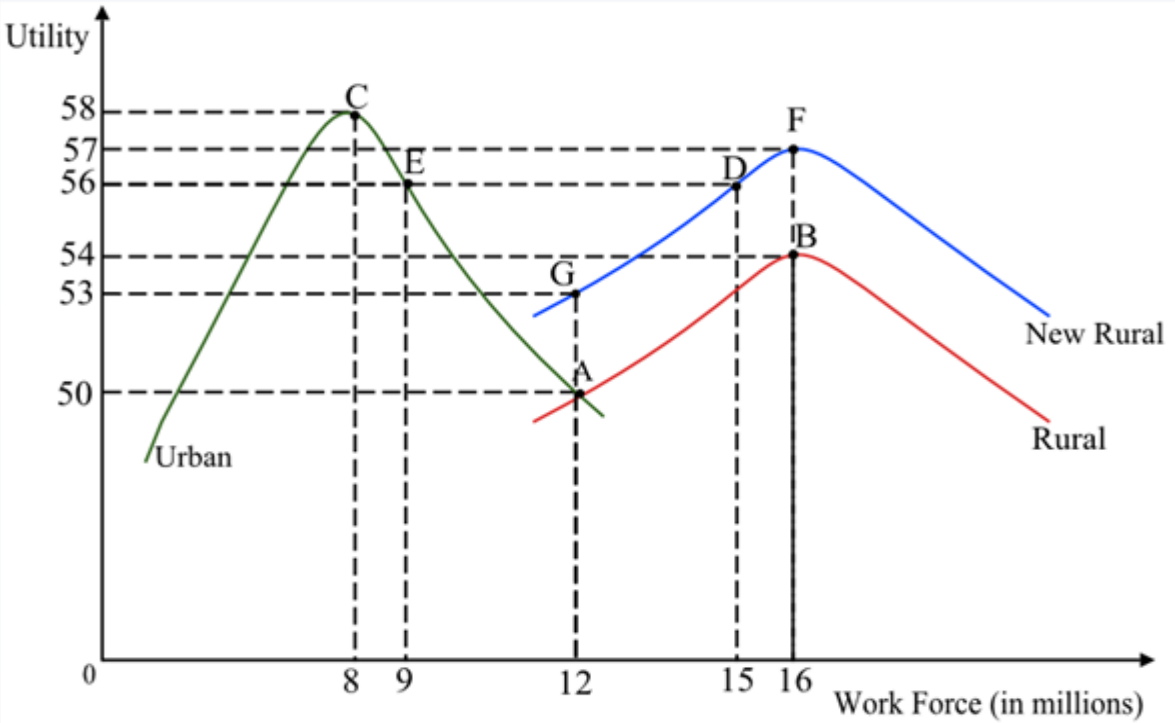



Figure 1

The red curve is the rural utility curve and the green curve is the urban utility curve. In the beginning, the nation's workforce is at point A and the common utility level is $50. Since the slope of the rural utility curve is $1 per million from 12 million to 16 million, the rural utility level at 16 million of work force is $54 [= 50 + (1) (16 – 12)]. Since the slope of the urban utility curve is –$2 per million from 8 million to 12 million, the urban utility level at 8 million work force is $58 [= 50 + (–2) (8 – 12)].

After infrastructure investment in rural area, the rural utility curve shifts up by $3. The new rural utility curve's peak is 57 (= 54 + 3) and is the blue curve shown in **figure 1**.

- **Step 2 of 4**
- b) At the current workforce allocation wherein each area has 12 million of workforce, the rural utility level ($53) is higher than the urban utility level ($50). **This means people will migrate from the rural area to the city.**
- **Step 3 of 4**
- c) As people move from the rural area to the city, utility rises in both the rural area and the city. Migration takes place until both the areas have the same utility level. As shown in the figure, this happens at the utility level of $56. Due to migration, the utility level rises in the rural area by $3 and in the city by $56.
- Therefore, migration **increases** utility in the rural area and **increases** utility in the city, with a **larger** change in the **city**.
- **Step 4 of 4**
- d) **In the new equilibrium, the population of the city is 9 million, the population of the rural area is 15 million, and the common utility level is $56.**

# Problem 7AC

7AC

Step-by-step solution

**Step 1** of 3

The discussion is all about the size distribution with an example with definite reason. There are 3 cities, city S, city M and city L. and with 60, 100 and 300 jobs respectively, with 1, 2, and 3 local jobs respectively.

**Step 2** of 3

(a)

| Expert workers | Local workers | Total |
|---|---|---|
| City S | 1 | (60+1) = 61 |
| City M | 2 | (100+2) = 102 |
| City L | 3 | (300+3) = 303 |

Here, it can be clearly seen that city S has 60 workers, a firm with total 100 workers, have 2 local workers and a firm with total 300 workers, have 3 local workers.

**Step 3** of 3

(b)

The answers are $\boxed{5 \text{ and } 4.96}$, because total employment of a city is determined by the sum of export employment and local employment.

# Problem 8AC

- Step-by-step solution
- Step 1 of 3
- Development of diverse cities is possible because of urbanization economies. In contrast, it is the economies of localization that are responsible for the creation and development of specialized cities. The two cities complement each other where one firm prospering in a diverse city eventually relocates itself to a specialized city.

- Step 2 of 3
- In this manner, firms attempt to first establish themselves in diverse cities where they take advantage of economies of urbanization, settling down with the design and innovation. Once these production processes are drafted, these firms find it more efficient to move to a specialized city where they can now take advantage of locational economies.

- Step 3 of 3
- These economies are the advantages in terms of reduced cost of production and transportation. Hence, large urban areas have firms providing various kinds of services that are not available in small urban areas because specialized services are featured by locational economies.

# Problem 9AC

- Step-by-step solution
- Step 1 of 3
- Capitals of the States are classified as regions with more public-sector undertakings than private ones. There is a plethora of specialized services because these areas are established as a result of localization economies. Government attempts to set up these regions as a place for strategic control over the entire State.
- Step 2 of 3
- There are however fewer places for dining, entertainment, which implies there are limited regions for tourists and occasional visitors. This is the reason for the claim that capitals of the States are somehow boring. Lack of facilities which could the result of urbanization is the reason for visitors to feel bored.
- Step 3 of 3
- Government in most countries, as the studies have found, attempt to develop large capital cities by pulling of resources from other areas in the hinterland. These areas do not serve for diverse activities where innovation and experiments are done. Less innovative sectors such as food, beverages, clothing and leather, are not likely to move to capital cities. This results in making them boring.

# Problem 10AC

- Step-by-step solution
- Step 1 of 2
- Export means, the goods and services that is produced in one country and purchased by the residents of another country, irrespective of the nature of goods or services or, the medium of shipping.
- Step 2 of 2
- Local good means the products (goods or services) that are produced locally. Now, let us look at the assumptions:-
- Assumption 1:- The export actually have, the same degrees of localization economies, that is why, the total export employment is same in two cities. As for example, there can be 50,000 glove workers in a city and 50,000 sock workers in another city.
- Assumption 2:- Here, both the cities have same per capita demand relative to scale economics in the production. As for example, 10 export workers create sufficient demand to support the tattoo workers, and also support a manicurist. Then, a total work force in both of the city is 60,000, including 50,000 export workers, and 5,000 tattoo workers and 5000 manicure workers.