TOPIC 5 REVIEW QUESTIONS

There are two people in the economy. Person 1 has utility function

$$u_1(G, y_1) = G^{a1} y_1^{b1}$$

and person 2 has utility function

$$u_2(G, y_2) = G^{a2} y_2^{b2}$$

where *y* is a private good, and *G* is a pure public good.

Recall that the MRS for preferences of this type is

$$MRS_{Gy} = \frac{ay}{bG}$$

Endowments of the private good are m_1 and m_2 for person 1 and person 2 respectively. The PPF for the economy is linear with slope $-\rho$. Thus, the transformation function is

$$Y = M - \rho G$$

where $M = m_1 + m_2$.

Questions 1 to 13 relate to this economy with following parameter values:

$$\{a_1 = 1,\ b_1 = 2,\ a_2 = 1,\ b_2 = 1,\ m_1 = 120,\ m_2 = 80,\ \rho = \tfrac{1}{2}\}$$

1. The Samuelson condition for this economy is

A. $\frac{2y_1}{G} + \frac{y_2}{G} = \frac{1}{2}$

B. $\frac{y_1}{2G} + \frac{y_2}{G} = \frac{1}{2}$

C. $\frac{y_1}{2G} + \frac{y_2}{G} = 2$

D. $\frac{y_1}{G} + \frac{2y_2}{G} = \frac{1}{2}$

2. The Samuelson condition identifies a unique point on the PPF.

A. True.

B. False.

Questions 3 – 13 relate to a non-cooperative simultaneous-move game between these people, where each person makes a voluntary contribution to the public good.

3. The best-response function for person 1 is

A. $g_1(g_2) = 120 - \frac{2g_2}{3}$

B. $g_1(g_2) = 120 - \frac{3g_2}{2}$

C. $g_1(g_2) = 80 - \frac{2g_2}{3}$

D. $g_1(g_2) = 80 - \frac{3g_2}{2}$

4. The best-response function for person 1 describes how person 1 will react to the contribution made by person 2.

A. True.

B. False.

5. The best-response function for person 2 is

A. $g_2(g_1) = 80 - \frac{g_1}{2}$

B. $g_2(g_1) = 120 - \frac{g_1}{2}$

C. $g_2(g_1) = 120 - \frac{2g_1}{3}$

D. $g_2(g_1) = 80 - \frac{3g_1}{2}$

6. The best-response function for person 2 is

A. negatively-sloped, reflecting the fact that contributions to the public good are strategic complements.

B. positively-sloped, reflecting the fact that contributions to the public good are strategic substitutes.

C. negatively-sloped, reflecting the fact that contributions to the public good are strategic substitutes.

D. positively-sloped, reflecting the fact that contributions to the public good are strategic complements.

7. The non-cooperative equilibrium (NCE) contribution from person 1 is

A. 30

B. 40

C. 60

D. 80

8. The NCE aggregate contribution is

A. 80

B. 90

C. 100

D. 120

9. At the NCE,

A. $MRS^1_{Gy} = 2$

B. $MRS^1_{Gy} = \frac{1}{2}$

C. $MRS^1_{Gy} = 1$

D. There is not enough information to make a determination.

10. The Pareto frontier in this game is

A. $g_2^{PF}(g_1) = 200 - \frac{5g_1}{2}$

B. $g_2^{PF}(g_1) = 80 - \frac{3g_1}{2}$

C. $g_2^{PF}(g_1) = 120 - \frac{2g_1}{3}$

D. $g_2^{PF}(g_1) = 140 - \frac{3g_1}{4}$

The next three questions require you to think beyond what you have seen in class.

11. Consider the point on the Pareto frontier where $g_1 = g_2$. Call this point the " equal-contribution allocation" (ECA). At this point, the aggregate contribution is

A. $G^{ECA} = 100$

B. $G^{ECA} = 200$

C. $G^{ECA} = 180$

D. $G^{ECA} = 160$

12. At the ECA allocation,

A. $y_1^{ECA} = 80 \quad \text{and} \quad y_2^{ECA} = 40$

B. $y_1^{ECA} = 40 \quad \text{and} \quad y_2^{ECA} = 80$

C. $y_1^{ECA} = 60 \quad \text{and} \quad y_2^{ECA} = 60$

D. $y_1^{ECA} = 80 \quad \text{and} \quad y_2^{ECA} = 80$

13. The ECA lies in the core with respect to the NCE.

A. True.

B. False.

14. The Mancur Olson conjecture asserts that

A. the NCE does not lie on the Pareto frontier.

B. public goods a re a special kind of positive externality.

C. free riding gets worse as the population grows.

D. the ECA lies outside the core if there are more than two players in the game.

Questions 15 to 25 relate to this economy with following parameter values:

$$\{a_1 = 1,\ b_1 = 1,\ a_2 = 2,\ b_2 = 1,\ m_1 = 160,\ m_2 = 60,\ \rho = \tfrac{1}{4}\}$$

15. The Samuelson condition for this economy is

A. $\frac{y_1}{2G} + \frac{y_2}{G} = \frac{1}{2}$

B. $\frac{2y_1}{G} + \frac{y_2}{G} = \frac{1}{4}$

C. $\frac{y_1}{2G} + \frac{y_2}{G} = 4$

D. $\frac{y_1}{G} + \frac{2y_2}{G} = \frac{1}{4}$

Questions 16 – 25 relate to a non-cooperative simultaneous-move game between these people, where each person makes a voluntary contribution to the public good.

16. The best-response function for person 1 is

A. $g_1(g_2) = 320 - \frac{g_2}{2}$

B. $g_1(g_2) = 180 - \frac{2g_2}{3}$

C. $g_1(g_2) = 220 - \frac{3g_2}{2}$

D. $g_1(g_2) = 100 - \frac{g_2}{3}$

17. The best-response function for person 2 is

A. $g_2(g_1) = 180 - \frac{g_1}{2}$

B. $g_2(g_1) = 320 - \frac{g_1}{3}$

C. $g_2(g_1) = 160 - \frac{g_1}{3}$

D. $g_2(g_1) = 100 - \frac{3g_1}{2}$

18. The non-cooperative equilibrium (NCE) contribution from person 2 is

A. 16

B. 32

C. 64

D. 96

19. The NCE aggregate contribution is

A. 96

B. 352

C. 228

D. 296

20. At the NCE,

A. $MRS^1_{Gy} = \frac{1}{4}$

B. $MRS^1_{Gy} = \frac{1}{2}$

C. $MRS^1_{Gy} = 1$

D. There is not enough information to make a determination.

21. The Pareto frontier in this game is

A. $g_2^{PF}(g_1) = 720 - \frac{3g_1}{2}$

B. $g_2^{PF}(g_1) = \frac{1440 - 2g_1}{3}$

C. $g_2^{PF}(g_1) = \frac{720 - 2g_1}{3}$

D. $g_2^{PF}(g_1) = \frac{1120 - 2g_1}{3}$

The next three questions require you to think beyond what you have seen in class.

22. Consider the point on the Pareto frontier where $g_1 = g_2$. Call this point the " equal-contribution allocation" (ECA). At this point, the aggregate contribution is

A. $G^{ECA} = 296$

B. $G^{ECA} = 376$

C. $G^{ECA} = 448$

D. $G^{ECA} = 526$

23. At the ECA allocation,

A. $y_1^{ECA} = 4$ and $y_2^{ECA} = 96$

B. $y_1^{ECA} = 44$ and $y_2^{ECA} = 8$

C. $y_1^{ECA} = 128$ and $y_2^{ECA} = 2$

D. $y_1^{ECA} = 104$ and $y_2^{ECA} = 4$

24. The ECA lies in the core with respect to the NCE.

A. True.

B. False.

25. In general, if there is enough asymmetry between the two persons, the ECA could lie outside the core with respect to the NCE.

A. True.

B. False.

ANSWER KEY

1. B
2. B
3. C
4. B
5. A
6. C
7. B
8. C
9. B
10. D
11. D
12. A
13. A
14. C
15. D
16. A
17. C
18. C
19. B
20. A
21. D
22. C
23. D
24. B
25. A