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Economics Part I. EQEM

Answers to Past Exam Papers

April 1999

A1. –

2. –

3. (a) $\begin{pmatrix} c-\beta y \\ y-c \end{pmatrix}$ (b) $\begin{pmatrix} c \\ y \end{pmatrix} = \frac{1}{1-\beta}\begin{pmatrix} \alpha+\beta I+\beta G \\ \alpha+I+G \end{pmatrix}$

4. $(1/4, 3/4)$ minimum

5. –

6. $\left(\frac{Mp_2}{p_1p_2+4p_1^2}, \frac{M}{\frac{p_2^2}{4p_1}+p_2}\right)$

7. (a) $P = 18q - 1 - \frac{3}{2}q^2$ (b) $q = 6$ $p = 16$

8. –

9. (a) $p^* = 1200/(1+\alpha)$ (b) $|\alpha| < 1$

B10. (b) 26.83 (c) hours worked unchanged; $U = 24$ revenue $= 24$ (d) hours worked = 13.2 $U = 24.15$

B11. –

12. –

13. (a) $y(1-\beta+\beta t) = \alpha - \gamma r + G - \beta\bar{T}$ (b) $y(1-t) = \frac{M}{\delta} + \frac{\varepsilon r}{\delta} + \bar{T}$ (c) Yuk (d) $r\uparrow$ and $y\uparrow$ unless $t>1$

14. –

15. –

October 1999

A1. –

2. (a) – (b) it increases it (c) output per worker $= 2\left(\text{capital per worker}\right)^{1/2}$

3. (a) $\begin{pmatrix} c-0.75y \\ y-c \end{pmatrix}$ (b) $\begin{pmatrix} 4 & 3 \\ 4 & 4 \end{pmatrix}$ (c) $c = 240$ $y = 300$

4. $(2, M-2)$ maximum

5. Min -35 at $x=6$; Max $= 19$ at $x = 3$

6. $\left(\frac{M}{2p_x}, \frac{M}{2p_y}\right)$

7. –

8. (a) $-1/2$, $1/2(1-e^{-4})$ (b) net area $= -12$

9. (a) $p^* = 600$ (b) $p_t = 600 + (-2)^t$ (c) No

B10. (a) $w = 250$ $b = 25$ (b) no effect (c) w, b unchanged; utility changes

11. –

12. –

13. –

14. –

15. (a) Market B (b) $q_A = 4/3$ $q_B = 22/3$ Profit $= 130\frac{2}{3} - \bar{c}$
(c) $q_A = 0$ $q_B = 12$ $p = 20$

April 2000

A1. –

2. (a) – (b) slope of MR curve is lower than slope of MC curve

3 (a) $\begin{pmatrix} x+5y \\ 2x+8y \end{pmatrix}$ (b) $\frac{1}{2}\begin{pmatrix} -8 & 5 \\ 2 & -1 \end{pmatrix}$ $x=-39$ $y=11$

4. $(0,1)$

5. max at $x=1$, equal to $1/e$, minimum at $x=0$ and ∞, where equal to zero.

6. $\left(\frac{M}{3p_1}, \frac{2M}{3p_2}\right)$

7. –

8. (a) $q_t = (2)^t$ (b) $q_t = -4(1/2)^t + 6$

9. (a) $p^* = 6$ (b) $p_t = -2(-3/2)^t + 6$ (c) Not stable

B10. ~~(a)~~ – (c) C: 22750 UK: 26000 (d) $Q_c = 0$ $Q_{UK} = 10000$ $P_{UK} = 25000$

(b) $Q_c = 3000$ $Q_{UK} = 8000$

11. $Y = [(a + bM_0/\beta + G - T_0(1-s))]/[t+s-st+b\alpha/\beta]$ $r = [a+G-T_0(1-s) - M_0(t+s-st)/\alpha]/\left[\frac{\beta(t+s-st)}{\alpha} + b\right]$

12. (a) $q_i = (98 - 5(n-1)\bar{q})/10$ (b) $\bar{q} = 98/(5(n+1))$ (c) $P = (100+2n)/(n+1)$ $\Pi = 98^2/(5(n+1)^2)$

13. (a) – (b) $5/((1+4(wr)^{1/2})$ (c) decreases as wage increases $L = q^2(r/w)^{1/2}$

14. (a) –

October 2000

A1. –

2. –

3 (a) $\begin{pmatrix} x+2y \\ y-x \end{pmatrix}$ (b) $\frac{1}{3}\begin{pmatrix} 1 & -2 \\ 1 & 1 \end{pmatrix}$ $x=5$ $y=10$

4. $(1, M-1)$

5. max -0.847 at $x = 1/\sqrt{2}$; minimum is $-\infty$ as $x \to \infty$

6. $\bar{q}^3\left(\frac{rw^{3/2} + wr^{3/2}}{(w^{1/2}+r^{1/2})^3}\right)$

7. –

8. (a) 0 (b) $1-3e^{-2}$ (c) 86.5

9. (a) $p^* = 1333$ (b) $p_t = A(-1.4)^t$ not stable (c) 733.5

B10. (a) – (b) – (c) both normal (d) $b = \frac{M}{3p_b}$ $c = \frac{2M}{3p_c}$

11. (a) $\frac{\partial Q}{\partial L} = 3\alpha\left(\frac{\alpha r}{(1-\alpha)w}\right)^{\alpha-1}$ $\frac{\partial Q}{\partial K} = 3(1-\alpha)\left(\frac{\alpha r}{(1-\alpha)w}\right)^{\alpha}$ (b) $p = \left(\frac{2463}{600}\right)$ $K = 141$ $L = 283$

12. (a) $Y = \frac{\bar{m} + kr}{h}$ and $Y = (\beta - \gamma r + \bar{G} + \bar{X} - \delta)/(1+e-\alpha)$

(c) increasing e decreases Y (d) $\Delta\bar{m} = \frac{kY}{\gamma}\Delta e$

13 (a) $p^* = 1.5$ $q^* = 14$ (b) $p_t^* = 3/2 + 4/5t$ so price increases with tax

(c) impact of a given t is less: $p_t^* = \frac{3}{2} - \frac{1}{5}t$

14. –

15. (a) $q_A = 2$ $q_B = 5/2$ $\Pi = 24.375 - \bar{c}$ (b) $p = 4/21$

April 2001

A1. —
2. (a) $25\alpha x^{\alpha-1} y^{\beta}$, $25\beta x^{\alpha} y^{\beta-1}$ (b) $-\alpha y/\beta x$ (c) slope becomes more −ve as β decreases
3. (a) £80 (b) £319, £68 (c) £303, £62
4. (a) $P = 200/(Q+1)$ (b) – (c) $P = 12.5$ $Q = 15$
5. $L = 21.9$ $K = 18.3$
6. (a) $[5900, 1100]$ (b) $[1005, 205]$ (c) 5790
7. (a) – (b) $-2/3$
8. (a) $y_t = 6.25(0.8)^t$ (b) $y_t = 50 - 56.25(0.8)^t$
9. (a) $Y_t = 0$ unstable
B10. (b) $Q = \cancel{40}$ (c) $Q = 20$ $\lambda = 30$ (d) Min price – 30
11. (a) – (b) – (c) $C_1 = C_2$ (d) one would consume more in period 2
12. (a)(iii) $q_i = (a-s)/b(N+1)$ (b) assuming (a)(iii) still holds, $s = \frac{c+a}{2}$
(c) $q_i = Q/N$ $Q = a/2b$
13. (a) $\beta_0 \Delta Y$ (b) $\bar{C} = \alpha + (\beta_0 + \beta_1 + \beta_2)\bar{Y}$ (c) system gets back to equilibrium after $t+3$ (d) $\beta_1 = \beta_2 = 0$ (trivial?)
14 (a) Market B ($\pi_B = 1250$ $\pi_A = 800$) (b) $Q_A = 10$ $Q_B = 20$
(c) $P = 67.5$
15. (a) – (b) – (c) cost = £4, inc. in utility = 0.14 (d) inc. in $u = 0.15$

September 2001

A1. —
2. (a) $\alpha x^{\alpha-1} y^{1-\alpha}$, $(1-\alpha) x^{\alpha} y^{-\alpha}$ (b) $-(\partial u/\partial x)/(\partial u/\partial y)$ (c) –
3. (a) $\begin{pmatrix} c-by \\ y-c \end{pmatrix}$ (b) $\frac{1}{1-b}\begin{pmatrix} 1 & b \\ 1 & 1 \end{pmatrix}$ $\begin{pmatrix} c \\ y \end{pmatrix} = \frac{1}{1-b}\begin{pmatrix} 2+5b \\ 7 \end{pmatrix}$
4. (a) max $26/3$ at $x = 2$, min $-1/3$ at $x = -1$
5. $(9/4, -7/8)$
6. —
7. (a) – (b) -2 (net area)
8. $-y(2+2x^2y)/x(6-2x^2y)$?
9. (a) $p^* = 20/(1+\phi)$ (b) $P_t = A(-\phi)^t$ stable if $|\phi| < 1$
B10. (a) – (b) $w = 4$ (c) $K = 10$ $L = 90$ (d) $L = \bar{Q}^2/16\bar{K}$, $C = \frac{w\bar{Q}^2}{16\bar{K}} + r\bar{K}$
11. (a)(b) $C_1 = (Y_2 + (1+r)Y_1)/((1+\beta)(1+r))$ $C_2 = \beta(Y_2 + (1+r)Y_1)/(1+\beta)$
(c) $\beta\uparrow \Rightarrow C_1\downarrow$; $r\uparrow \Rightarrow C_1\downarrow$; $Y_1\uparrow \Rightarrow C_1\uparrow$ (d) $\beta\uparrow \Rightarrow C_1\downarrow$; $Y_1\uparrow \Rightarrow C_1\uparrow$
$C_1 = \frac{Y_1+Y_2}{1+\beta}$ $C_2 = \frac{\beta(Y_1+Y_2)}{1+\beta}$
12. (a) $Q = 50$ (b) $Q_A = 35$ $Q_B = 15$
13. (a)(b) – (c) tax on consumption: $z = 24(1+v)p^2/(wp + (1+v)p^2)$
tax on income: $z = 24p^2/((1+t)wp + p^2)$
14. (a) – (b) $\Delta Y_t = \Delta G/(1-b-\theta)$ (c) $Y^* = \bar{G}/(1-b)$; $C^* = b\bar{G}/(1-b)$; $I^* = 0$
(d) $\Delta Y^* = \Delta G/(1-b)$ (e) $Y_t = -3Y_{t-1} + 10G_t$ so equilib. becomes unstable
15. (a) $i = 6.5$ $Y = 275$ (b) $G = 300$ so debt = 250 (ii) debt = 11.1 (iii) 7.5
(iv) $M = 95$ $i = 5.5$ $M = 85$ and $G = 55$

April 2002

A1. –

2. (a) $\alpha x^{\alpha-1} y^{1-\alpha}$ $(1-\alpha)x^{\alpha}y^{-\alpha}$ (b) $\alpha y/(\alpha-1)x$

3. (a) $\begin{pmatrix}13\\3\end{pmatrix}$ (b) $\frac{1}{4}\begin{pmatrix}1 & -3\\1 & 1\end{pmatrix}$ (c) -2 (d) $\begin{pmatrix}2 & -1\\8 & -4\end{pmatrix}$

4. (a) min -23 at $x=3$; max 11 at $x=1$

5. $(0,5)$

6. –

7. (a)(b)(c) – (d) $52/3$

8. $1/(2-2x)$

9. –

B10. (a) – (b) $\lambda = 0.339$ = increase in utility (c) $(4,3)$ (d) $\mu = 0.039$ $\lambda = 0.271$

11. (a)(b) $C = 24w\alpha/p$ $z = 24(1-\alpha)$ (c) no effect
    (d) leisure falls; labour supply increases

12. –

13. (a) $p^* = 6/(1+b/2)$ (b) $6/(1+b/2) + (P_0 - 6/(1+b/2))(-b/2)^t$ (c) $-2 < b < 2$

14. (a) $Q_n = (150 - Q_p)/2$ (b) $Q_n = 50$ $Q_p = 50$ $P = 80$
    (c) total output = 120 $P = 60$ (d) profits fall by 1400 (e) $P \to 30$

15. (a) $i = 9$ $Y = 300$ (b) 10 in favour of exports