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Economics Part I Paper 3

Answers to Past Exam Papers

NB: I make algebraic slips, like most people: don't take these answers as perfect!

1999

A1.–
2.–
3. mean = 24.66 Mode = 23.4 (via the more precise formula)
4. IQR = 0.82 CoV = 1.2
5 (a)(i) $(5/6)^4$ (ii) $4(5/6)^3(1/6)$ (iii) $6(5/6)^2(1/6)^2$ (iv) $4(5/6)(1/6)^3$ (v) $(1/6)^4$
(b) $(6/17)(5/16)$
6. (a)(i) 0.1389 (ii) 0.1841 (iii) 2.05 (b) 4.56%
7. mean 10.89 ± 0.83 var 0.64 to 4.5
8. $z = 2.7$, critical z 2.81 so do not reject
9. [illegible] –
10. (a) $n = 49$ (b) at least 6.4%
B11 (a) $z = 1.94$, critical z 1.64 so reject $p = 0.6$ in favour of $p = 0.9$
(b) 0.596 to 0.969 (c) new z is −0.48
12. E vs A: (c) $r = 0.896$ $t = 5.71$ t critical = 2.306 (d) 39.2
E vs I/A: (c) $r = 0.964$ $t = -10.3$ t critical = 2.306 (d) 37.4
13.–
14.–
15.–

2000

A1.–
2.–
3. $z = 0.497$ so do not reject hypothesis of no difference
4. (a)(i) $(4/52)^4$ (ii) $24/(52)(51)(50)(49)$ (b) $(1/4)^4$ (c) $(1/13)^4 + (1/4)^4 - (1/52)^4$
5. $t = 0.18$ so no evidence of a significant relationship
6.–
7. (a) Median in 50–60 band mode in [illegible] 50–60 and 20–30 bands
(can't be bothered to do the more precise formulae!)
8. (a)(i) 600 ± 9.8 (ii) 600 ± 11.76 (iii) 600 ± 32 (b) 2778 to 4850
9.–
10.–
11.–
12.–
13. (b) $r = 0.637$ $t = 2.61$ t critical = 1.812 (1 tailed) 1.833 (1 tailed)
(without bs: $r = 0.303$ $t = 0.95$ t critical
14.–
15. (a) $z = 1.60$ so not significant (b) $t = 3.2$ so clearly significant
(c) χ^2 now −0.60 so not significant (d) $F = 1.15$, critical $F \sim 3.05$ so not significant

2001

A1: (a) 79.4% (b) $\gamma = 796$

2. –
3. –
4. (b)
5. 9.4×10^{-3}
6. $\hat{\mu} = \frac{1}{n} \Sigma y_i$
7. –
8. –
9. –
10. –

B11. –

12 (a) $r = 0.85$ $t = 4.3$ (b) $r = -0.866$ $t = -4.6$

13. (a) £121k (b) β_2: -12.9 to -0.4 β_3: 2.66 to 3.31

14. (a) $H_0: \mu = 3$ $H_1: \mu < 3$ (b) reject H_0 if $\bar{x} < 2.95$ (where H_0 rejected)

15. –

2002

A1. –
2. –
3. –
4. (a)(i) 1/6 (ii) 5/6 (b)(i) 1/120 (ii) 1/5
5. mean = 36.2 median = 20 (couldn't be bothered to do the more precise formula) ↳ now have: 18.75
6. mean: 14.3 ± 1.9
   var: 1.5 to 20.5
7. –
8. 0.727
9. $z = 3.7$ so reject null hyp. of no difference
10. –

B11. –

12. (a) $r = -0.361$ $t = -1.02$ $t_{crit} = 2.365$ (c) $r = -0.708$ $t = -2.46$ $t_{crit} = 2.447$
    (b) all points included: -0.827 to 0.399; Ireland excluded: -0.942 to -0.0067
13. – see below
14. (a) North: mean = 16 stdev = 2.33
    South: mean = 18 stdev = 2.22
    (b) [redacted] 2.0 ± 1.3
    (c)(i) $t = 3.1$ so significant (ii) $t < 1.5$ so not significant
    (d) $F = 1.10$ so not significant (critical $F = 2.269$)
15. –

B13: (b) $P = \underset{(36.5)}{35.4} - \underset{(9.9)}{0.305}$ $R^2 = 0.00015$

(c) $P = \underset{(3.6)}{-11.1} + \underset{(1.3)}{12.25}$ $R^2 = 0.86$ (d) 87

2003

A1. -33 at $x=-3$ and 19 at $x=-1$

2. (a) homogeneous, degree 3 (b) homogeneous degree 1

3. (a)(i) $\begin{pmatrix}900\\090\\009\end{pmatrix}$, (ii) as (i), (iii) $\begin{pmatrix}18\\-9\\27\end{pmatrix}$ (b) $x=2\ y=-1\ z=3$

4. $(2, 1.5)$ min, $(-2, -1.5)$ max

5. (a) $f_x=33\ f_y=6$ (b) $10z+3$

6. $Q=34.14$

B1. (a) $4+250r=9150$ (b) $4-1250r=-1350$ (c) $r=7\ Y=7400$
(d) $G=2130$

2. (a) $x=\frac{3B}{5P_x}\ y=\frac{2B}{5P_y}$ (b) $x=\frac{3B}{5(P_x+1)}$ y as before, so utility changes by a factor $\left(\frac{P_x}{P_x+1}\right)^{1/2}$

(c) $x=5\ y=2$ (d) $x=3\ y=2$

3.

C1. 3/4

2. (a) $z=1.6$ so do not reject H_0 (H_0: plant A) } not at all clear what they intend you to use for Hoard H_1
(b) 0.196

3. –

4. (a)(i) 400 ± 9.8 (ii) 400 ± 12.25 (iii) 400 ± 20.64
(b) 1876 to 3500

5. (a) – (b) 0.14 to 0.61

6. –

7. (a) $z=1.15$ so do not reject H_0 where H_0: no decline
(b) –

D1 (a) $\alpha=4\ \beta=0.5$ (c) $y=12$

2 (a) –
(b) $\alpha=11.32\ \delta_1=-28.37\ \delta_2=-17.18\ \delta_3=-15.45\ R^2=0.94$
$\gamma=1.43$

3. (d) $t=1.91$, critical $t=1.725$ so reject H_0 (H_0: means identical)
(e) sample size $=10$ (f) $F=9.62$, suggests variances not equal.

4. (a) 1981M1–1990M12: $z=0.16$ not significant
1991M1–2000M6: $z=1.54$ " "
(b) 2.3 to 7.4

2004

A1. (a) $Y = 15 + M^{5}/2 + G$ (b) –

2. –

3 (a) if $\dot{x} = 3$ $a = 1$ $b = -1$: (i) $4(31) - 31^2/36$ (ii) $e^x/(e^x+1) - 1/x$; 0.619 at $x = 3$

(b) yawn

4. (a) $x = -4$ $y = 2$ (b) $\begin{pmatrix} x+3y \\ 3x+8y \end{pmatrix}$ (f) $A^{-1} = \begin{pmatrix} -8 & 3 \\ 3 & -1 \end{pmatrix}$ rest undefined

5. $y = 10e^{0.03t} + 50$

6. –

B1. (a) – (b) $X_1^* = (p_1 a - 5p_1 + 2p_2)/2p_1$ $X_2^* = (p_1 a + 5p_1 - 2p_2)/2p_2$

(c) $\frac{1}{2}p_1 a + 5p_1/2 - p_2$ in both cases

(d) $\partial U^*/\partial a = (p_1 a + 5p_1 + 2p_2)/2p_2$ $\partial X_1^*/\partial a = 1/2$ $\partial X_2^*/\partial a = p_1/2p_2$

2. (a) $p^* = 40$ $q^{d*} = 10$ (b) $p_t = (p_0 - 40)\left(\frac{-1}{2}\right)^t + 40$ (c) Stable

C1. (a) 2/5 (b) 3/4

2. (a) – (b) 0.155 (Binomial as $np(1-p) < 10$)

3 (a) $t = 2.03$ so reject H_0 (ie reject hypothesis of equality) (b) $F = 2.115$ do not reject H_0 (vars equal)

4. They've mixed two issues: (a) correlation ≠ causality
(b) regressing y on x ≠ regressing x on y

5. (a) – (b) 7; 54.7

6. $z = 2.69$ so reject H_0 at 5% level

7. $H_0 (\sigma = 40)$ not rejected; $H_0 (\sigma = 60$ not rejected)
So Type II Error probability must be quite large

D1. (a) ? range of incomes has increased ?!

(b) before tax: (LQ, Median, UQ) = (£584, 13066, 20261) IQR = 89%

after tax: " " " = (£107, 11711, 17551) IQR = 81%

(c) 96/97 – 03/04 reversed pattern of 79/80 – 96/97

(d) Mode = 11 229 so dist^n is skewed

2. If you plot the graph, it's obvious student 10 is an outlier
But ignoring that & using all data:

(a) (i) $t = 0.41$ so do not reject H_0

(ii) $z = 0.45$ so " " " BUT – this test only valid if $n_1\hat{\pi}_1(1-\hat{\pi}_1) > 10$ or $n_2\hat{\pi}_2(1-\hat{\pi}_2) > 10$!!

(b) $r = 0.56$ $t = 1.89$ do not reject H_0

(c) $r = 0.97$ $t = 11.6$ and clearly reject H_0

3. (a) $\hat{\alpha} = -7.3$ $\hat{\beta} = 0.75$ (b) – (c) 1 & 3 (d) 0.75 ± 0.16 (e) – (f)?
though we ought to regress i on e. → Looks perfectly OK to me.

2005

A1. $x_1^* = 3$ $x_2^* = 4$

2. (a) $L = \bar{Y}^{3/2}$ $K = \bar{Y}^{3/2} + 2$ (b) $4\bar{Y}^{3/2} + 4$ (c) $4\bar{Y}^{1/2} + 4/\bar{Y}$; $6\bar{Y}^{1/2}$

3. (b) $x_1 = -14$ $x_2 = -92/3$ $x_3 = -118/3$

4. (a) $-2x^{-1/2} + c$ (b) $\frac{8}{3}(x+2)^{3/2} - \frac{16}{15}(x+2)^{5/2} + c$ or: $8/5(x+2)^{5/2} - \frac{16}{3}(x+2)^{3/2} + c$ (equivalent) (c) $\frac{26a}{3} + 4b + 2c$

5. (a) $2/x - 24e^{-3x}$ (b) $(3x+1)^{-4/3}(x-1)^{-1/3}(x+5/3)$

6. $y^{1/3}(5x^4 + 2xy - 4x)$; $y^{-2/3}x^2(x^3 + 4y - 2)/3$

B1 (a) $x = I/4p_x$ $y = 3I/4p_y$ (b) yes (c) (10, 40) (d) (10, 30)

(e) income effect -7.5 subst. effect -2.5

2 (a) $Y(1 - c + ct) + br = C_0 + I_0 + \bar{G}$ (b) $aY - dr = \bar{m}$

(c) $Y = \frac{b\bar{m} + (C_0 + I_0 + \bar{G})d}{ab + d(1 - c + ct)}$ $r = \frac{-m(1 - c + ct) + a(C_0 + I_0 + \bar{G})}{ab + d(1 - c + ct)}$

(e) $\Delta Y = \left[[ab + d(1 - c + ct)]/[ab + d(1 - c + ct)][1 - c + ct]\right]\Delta\bar{G}$

$\Delta Y = \frac{1}{t}\Delta\bar{G}$? Income tax issue is ambiguous.

C1 (a) (iv) (b) mean = 69.72 median = 70.91 var = 99.96 do not reject experts' forecast

2 (a) (i) 5.8, 35.5 (ii) 2.3 to 9.2, 18.9 to 96.1 (b)

3. -0.93 to -0.35

4. (a) $\alpha = \gamma_0$ $\beta = 1 - \gamma_p$ (b) $-\gamma_p$ and $-a/S$

5. Q1: 4.9 Q2: 20.7 Q3: -12.6 Q4: -3.6

6. (a) (i) $k = 55$ (ii) 4.09, 1.07 (b) 0.41

D1 (a) – (b) $\hat{\alpha} = .87$ $\hat{\beta} = -4.9$ (c) $r = -0.77$ $t = -3.4$ so the claim is reasonable

2. (a) $R_t^A = (P_t^A - P_{t-1}^A + D_t^A)/P_{t-1}^A$ etc. ($\times 100\%$)

(b) Skewness: A: -0.52 B: -0.18

Kurtosis A: 6.63 B: 3.51

(c) zero for both

(d) $F = 2.86$; critical F is 1.984 (one tailed) reject null hyp that $\sigma_A = \sigma_B$