2011

A1. (i) $-1 \leq x \leq 1$; (ii) $\frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}}$.

2. (i) $\begin{bmatrix} \alpha(\alpha-1)K^{\alpha}\ln(L+\beta) & \alpha K^{\alpha-1}(L+\beta)^{-1} \\ \alpha K^{\alpha-1}(L+\beta)^{-1} & -K^{\alpha}(L+\beta)^{-2} \end{bmatrix}$.

3. (i) $\alpha\beta \neq 3$; (ii) $-\sqrt{2} < \theta < \sqrt{2}$.

4. (i) $y = 500e^{-\alpha t}$; (ii) 6.93.

B5. (i) $\frac{\partial u}{\partial x} = 1 + 2\sqrt{\frac{y}{x}}, \frac{\partial u}{\partial y} = 2\left(\sqrt{\frac{x}{y}} + 2\right)$; (ii) $1 + 2\sqrt{\frac{y}{x}} = 3\lambda$, $\sqrt{\frac{x}{y}} + 2 = 3\lambda$, $3x + 6y = 30$; (iii) $x = 5, y = \frac{5}{2}$.

6. (i) $\begin{bmatrix} 1-c-a+ct & b \\ \alpha & -\beta \end{bmatrix}\begin{bmatrix} Y \\ r \end{bmatrix} = \begin{bmatrix} \bar{C}+\bar{I}+\bar{G} \\ M_s \end{bmatrix}$; (ii) $-\beta(1-c-a+ct) - \alpha b$

(iii) $Y = \frac{\beta(\bar{C}+\bar{I}+\bar{G})+bM_s}{\beta(1-c-a+ct)+\alpha b}, r = \frac{\alpha(\bar{C}+\bar{I}+\bar{G})-(1-c-a+ct)M_s}{\beta(1-c-a+ct)+\alpha b}$; $\frac{\partial r}{\partial \bar{I}} = \frac{\alpha \bar{I}}{\beta(1-c-a+ct)+\alpha b}$, so r falls when $\bar{I}$ falls; (iv) β/b.

C7. (a) results are significant: sample is 1.98 stdevs from mean, critical one tailed value is 1.645; (b) sample statistic is 1.543, claim is supported at 10% (critical 1.282) but not 5% (critical 1.645).

8. (a) -2; (b) N=81.

9. (a) $\alpha = 8.59, \beta = 0.606$; (b) 21; (c) 389.

10. -

D11. (d) $\mu_0 = 6.91$; (e) $\mu_0 = 6.91, 7.23$; (f) Assuming we use $t_{35} = 2.03$ rather than 1.96 standard deviations then 7.3 ± 3.1, actual value of 12% is 1.56 stdevs above expected, so still plausible.

12. (a) 8; (c) $E(X) = E(Y) = 1, E(XY) = \frac{5}{4}$; $Covar = \frac{1}{4}$; (d) $E(X|Y=2) = \frac{3}{2}, var(X|Y=2) = \frac{1}{4}$.