**Department of Economics** **University of Victoria**

**ECON 546: Themes in Econometrics**

**Arrangements for the Final Exam, Spring 2010**

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**Date:** Friday 16 April

**Time:** 10:00a.m. - 1:00p.m.

**Place:** **BEC 363**

**Weight:** 40% of the final grade for the course

**Examinable Material:**

All of the material covered in lectures, labs, and assignments during the course is examinable. However, the main emphasis will be on the material covered from the beginning of the topic "Hypothesis Testing" – *i.e.*, roughly since the mid-term test.

**Format:**

The test will be graded out of 90 marks. The questions will be of the following types:

- Analytical/Written Questions (70 marks).
- Interpretation of EViews output – you will **NOT** be asked to write or interpret any EViews programming code (20 marks).

**Other Information:**

- This will be a closed book/closed notes test.
- Calculators may be used.
- The required statistical tables will be supplied as part of the question sheet, and will be photocopied from the 6th edition of Greene's textbook.
- A brief formula sheet will be provided (see overleaf), but the wording of the questions will provide you additional information of this type that you may need.
- Copies of previous tests, and solutions, are on the class web page. These will give you a good indication of the general style of the "written" questions that you will encounter.

# ECON 546: Formula Sheet for Final Examination

## Vector Differentiation

(i) $\partial(x'Ax)/\partial x = (A + A')x = 2Ax$ (if $A$ is symmetric)

(ii) $\partial(a'x)/\partial x = a$

## Asymptotic Theory

(i) $I(\theta) = -E[\partial^2 \log L(\theta)/\partial\theta\partial\theta']$

(ii) $IA(\theta) = \underset{n\to\infty}{Limit}[\frac{1}{n} I(\theta)]$

(iii) $I^*(\tilde{\theta})$ satisfies $\underset{n\to\infty}{Limit}[\frac{1}{n} I^*(\tilde{\theta})] = IA(\theta)$

(iv) $\sqrt{n}(\tilde{\theta} - \theta) \to N[0, IA^{-1}(\theta)]$

## Tests

(i) LRT: $\tilde{\lambda} = L(\tilde{\theta}_0)/L(\tilde{\theta}_1)$ ; and $-2\log(\tilde{\lambda}) \xrightarrow{d} \chi^2_J$ if $H_0$ is true

(ii) Wald: $W = (R\tilde{\theta}_1 - r)'[RI^*(\tilde{\theta}_1)^{-1}R']^{-1}(R\tilde{\theta}_1 - r)$

(iii) LM: $LM = D\log L_1(\tilde{\theta}_0)' I^*(\tilde{\theta}_0)^{-1} D\log L_1(\tilde{\theta}_0)$

## Completing the Square

(i) $ax^2 + bx + c = a[x + (b/2a)]^2 + [c - (b^2/4a)]$

(ii) $x'Ax + x'b + c = (x + 0.5A^{-1}b)'A(x + 0.5A^{-1}b) + (c - 0.25b'A^{-1}b)$

## Distributions

Multivariate Normal: $p(y \mid \mu, V) = (2\pi)^{-n/2} \, |V|^{-1/2} \exp[-0.5(y-\mu)'V^{-1}(y-\mu)]$

Multivariate Student-t: $p(y \mid \mu, V, \nu) = \dfrac{\nu^{\nu/2}\Gamma[(\nu+n)/2]\,|V|^{1/2}}{\pi^{n/2}\Gamma(\nu/2)}[\nu + (y-\mu)'V(y-\mu)]^{-(n+\nu)/2}$

Inverted Gamma: $p(y \mid \nu, s) = \dfrac{2}{\Gamma(\nu/2)}\left(\dfrac{\nu s^2}{2}\right)^{\nu/2} y^{-(\nu+1)} \exp[-\nu s^2/(2y^2)]$ ; $0 < y < \infty$

## Bayes' Rule

$$p(\theta \mid y) = \frac{p(\theta)p(y \mid \theta)}{p(y)} = \frac{p(\theta)p(y \mid \theta)}{\int_\Omega p(\theta)p(y \mid \theta)d\theta} \propto p(\theta)p(y \mid \theta)$$

where $p(y \mid \theta) = L(\theta \mid y)$ (the conditional data density equals the likelihood function)