Directed Studies VHM 881 Course
Fall 2004, Atlantic Veterinary College, PEI
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Final exam for Elmabrok Masaoud

The exam consists of 4 parts (below), which should all be answered. The exam starts at 9am, Monday 13/12, and ends at 4pm, Wednesday 15/12. It is worth 40% of the course mark. All aids except personal assistance are allowed.

Part 1
Describe in your own words and in formulae the difference between a marginal logistic regression model and a conditional (random effects) logistic model. For simplicity, you may assume that the data structure corresponds to a 2-level hierarchy (e.g., animals in herds).

Part 2
Exercise E 3.15 in the textbook. You may use the result of E 2.19 without proof (you will get extra credit if you prove it, but that is not required). Note that there is a misprint around formula (3.128) which you have to detect on your own when you solve E 3.15.

Part 3
Confirm the result in Part 2 by a simulation study where you analyze suitably constructed, simulated 2-level datasets by a marginal model and a conditional model, and compare the parameter estimates obtained. For the marginal model analysis, use the GEE procedure (as explained in Venables & Ripley, 4th ed.) with an exchangeable correlation structure; no detailed explanation is required about the GEE method.

Part 4
How should the formula (3.128) be generalized to multiple random effects? Consider specifically a 3-level hierarchical data structure and a model with random intercepts only. You are not required to give proofs for your formula(e) but you must explain how you arrive at them, and why you think they are correct.