Take Home Final

MATH G6071: Numerical Methods in Finance
Dave Bayer, April 29, 1998

[**1**] List each programming assignment that you have submitted for this course. Indicate roughly when it was submitted, whether it was submitted by email or physically, and whether it was an individual or group project. If you are expected to submit an assignment shortly, indicate when I can expect it, and how I can reach you to find out its status.

What percentage of your final grade would you like to be determined by the programming assignments? Please choose a percentage between 60% and 98%.

Work as many of the following problems as you feel is necessary, given the programming percentage you have selected.

[**2**] Describe various ways that a poor random number generator can cause unintended problems in use. How would you select and test a random number generator for production use?

[**3**] Explain the stochastic differential equation

$$\frac{dS}{S} = \sigma \, dX \ + \ \mu \, dt$$

in the context of finance.

[**4**] Derive the basic Black-Scholes equation, as simply as possible.

[**5**] Compare the explicit, implicit, and Crank-Nicolson finite difference methods for pricing options.

[**6**] Explain what a free boundary problem is, and how one prices an American option using the Projected SOR algorithm.

[**7**] Explain how numerical methods for pricing options take into account dividends.

[**8**] Find a typo or an error in our text, [WDH].