Assignment 2 - Math 772
Interest Rates and Credit Risk Modeling

11/02/2005

1. For both the Merton and first passage (with a time-varying barrier) models for default arrival:

- choose a reasonable set of parameters under the historical measure P

- simulate 10000 Monte Carlo paths for the the asset value dynamics over the interval of one year;

- calculate the default time for each replication and obtain a histogram for the distribution of default times not greater than T=1 year;

- compare the results with the theoretical formulas for $P[0 < \tau \leq T]$.

2.

- Obtain (by searching the literature on exotic options) an expression for the equity value of a company according to the first passage (with time-varying barrier) model for default arrival.

- Do a numerical analysis of its behavior with respect to volatility.

3.

- Obtain (by taking limits of the formula given in class) the asymptotic behavior of yield spread in the Merton model (assume a constant interest rate r).

- Find the maturity time which maximizes this spread.

- Plot the term structure of this spread for fixed A_0, K, r and three different values of volatility σ (make sure to choose an appropriate range of maturities)