

UNIVERSITY OF TEXAS AT AUSTIN

Quiz #10

Log-normal stock prices: Tail probabilities and VaR.

Provide your **complete solution** to the following problems. Final answers only, without appropriate justification, will receive zero points even if correct.

Problem 10.1. (15 points) Let the current stock price be denoted by $S(0)$. We model the time- T stock price as lognormal. The mean rate of return on the stock is 0.12, its dividend yield is 0.02, and its volatility is 0.20. The continuously compounded risk-free interest rate is 0.04. You invest in one share of stock at time-0 and let all the dividends be continuously and immediately reinvested in the same stock. You simultaneously deposit an amount $\varphi S(0)$ in a savings account. What should the proportions φ be so that the VaR at the level 0.05 of your total wealth at time-1 equals today's stock price?