Midterm Exam
BUFN400—Financial Markets and Datasets—Fall 2022

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CSI 3118—October 26, 2022—2:00 p.m. to 3:15 p.m.

Label each of the following statements as TRUE, FALSE, or UNCERTAIN. For each statement, justify your answer with a few sentences or a brief paragraph.

Note that these statements may be inherently ambiguous, some statements may have no correct or incorrect answer, and there may be multiple issues to address in one statement. Your grade is based on how well you justify your answer, not on whether your answer is "right" or "wrong."

You should attempt to answer all questions. You have 75 minutes to complete the exam.

1. Jensen's inequality says that the continuously-compounded yield to maturity on a bond is always less than the bond-equivalent yield to maturity.
2. The expectations hypothesis of the term structure of interest rates implies that future short-term interest rates will be the same as current interest rates, with essentially zero volatility.
3. Over the past 100 years, nominal interest rates have varied less than real interest rates.
4. Gordon's growth formula $\mathrm{E}[D(t + \Delta t)]/(r_f + \beta \cdot \pi - g)$ tells us that the present value of an investment is negative if the growth rate g is high enough.
5. As long-term interest rates increase, the duration of existing 30-year fixed-rate mortgages will increase but the duration of new 30-year fixed-rate mortgages will decrease.
6. When using geometric Brownian motion to model an asset with expected return μ and volatility σ, the formula $\mathrm{e}^{\mu \cdot \Delta t + \sigma \cdot \Delta B}$ needs an additional adjustment term in the exponent to correctly capture risk aversion.
7. If risk is rewarded in the market, an investor who takes on more risk is likely to earn a higher internal rate of return over a long period than an investor who takes on less risk.
8. When using *pd.read_csv(...)* to construct a Pandas dataframe, it is always better to let Pandas automatically determine the types of the variables than to read all data as strings.
9. Recent instability in the UK government securities ("gilt") market occurred because stocks and bonds held as pension assets have a different duration from pension liabilities.
10. The Capital Asset Pricing Model implies that for any asset, we should obtain $\alpha = 0$ and $\beta = 1$ in the linear regression $R - R_f = \alpha + \beta \cdot (R_M - R_f) + \epsilon$ (where R_M is the return on the market portfolio, R is the return on an arbitrary asset, and R_f is the return on the risk-free asset).