How to study for the final
FIN 539
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We have covered a lot of material. 😎 The practice exam and the homeworks give a good idea what to expect on the exam, but here is some more guidance.

For calculations and problem-solving, this is what you can expect:

1. Dynamic programming, homogeneity, and the one-shot approach are the most important take-away from the course and at least two of these will show up in problems on the exam.
2. For dynamic programming, you should know how to write down a continuous-time choice problem, finite horizon or infinite horizon, and solve it using the "martingale appoach" of Fleming and Richel to derive the Bellman equation from the process M_t. Remember that M_t is a martingale for the optimal strategy so its drift is zero, and M_t is a supermartingale for any strategy, so its drift is less than or equal to zero. This implies that the maximum drift equals zero, with the maximum at the optimal strategy, and this is the Bellman equation. You should be able to write down the Bellman equation for a simple problem (such as the one with labor income in the problem set) that requires the multidimensional Itô's lemma.
3. You should be able to use homotheticity to prove the form of the value function for log or power utility and variants. This is especially useful, because it simplifies the differential equation we need to solve for the solution.

For some topics, I want you to be able to state the results and discuss the economics, but I will not require any calculations.

1. We talked about four asset pricing models: CAPM, CCAPM, ICAPM, and APT. You should be able to state in words how they are different, but you needn't write down the pricing formulas or do any derivations.

2. You should know that a covariance matrix must be positive semi-definite (all eigenvalues nonnegative) and why. You should also be able to suggest what to do if someone gives you a covariance matrix that is not positive semi-definite.

3. As in the problem sets, you should be able to interpret in words quantities such as $\mathrm{E}[M_s] - \mathrm{E}[M_t]$ for $s < t$ in dynamic programming.

4. You should be able to say the economic meaning of a utility function having constant relative risk aversion or constant absolute risk aversion.

Some things are interesting or important but will not be on the final.

1. Kuhn-Tucker theorem: This is an important workhorse theorem, but it will not be covered on the final.

2. You should know that agents who have von Neumann-Morgenstern utility functions are risk averse if their utility functions are strictly concave. You needn't remember the definitions of absolute risk aversion $-u''(c)/u'(c)$ and relative risk aversion $-cu''(c)/u'(c)$, although these can be helpful for getting intuition about optimal portfolio choices.

3. The Fundamental Theorem of Asset Pricing is a useful for thinking about arbitrage, but we may not get to it in class, so it won't be on the exam.

I will provide a sheet of formulas in the exam, including univariate Itô's lemma, multivariate Itô's lemma, definitions of absolute and relative risk aversion, the Black-Scholes differential equation, and formulas for the state-price density (stochastic discount factor) process.