Midterm (75 minutes)

No calculators allowed; if calculations are needed, write the explicit equation(s), identifying the variables. Do not write "Y = aX; solve for X." You can write "100 = 10X; solve for X." BE SURE TO EXPLAIN YOUR REASONING. If you want extra time, you can buy time at a price of 1 point a minute; for example, if your test is handed in 10 minutes after the scheduled finish time, 10 points will be subtracted from your test score.

1. The winner of a September 2013 $400 million Powerball lottery jackpot was offered an immediate one-time payment of $223 million or 29 annual payments of $13.8 million, beginning immediately. What is the implicit interest rate that was used to determine the $223 million payment?

2. Here is an excerpt from a Yahoo Finance blog:

> [Apple] is still sitting on a cash hoard of $147 billion, annoying investors such as Icahn who want the company to put that money to work for shareholders. Despite the recent rally, Apple shares remain 27% below the all-time high of $705.07 reached last September.
>
> Much of Apple's cash is effectively trapped overseas due to the company's tax-reduction strategies, so Icahn wants Apple to sell bonds and use the proceeds to buy back shares.
>
> Ultimately, the success of a bigger buyback program comes down to whether Apple brings out more great products and reinvigorates sales and profit growth, argues Greg Milano, chief executive of Fortuna Advisors....
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> Still, not everyone thinks it is a mistake for Apple to heed Icahn's advice. Ken Yook, a professor at the Johns Hopkins Carey Business School and an expert on stock repurchase plans, says Apple could take advantage of [...] by following Icahn's plan and "unlock its hidden value."

What do you suppose are the missing words in the last sentence? Explain your reasoning.

3. A *Washington Times* writer observed that

> The money center banks are highly profitable indeed. Bankers Trust's $371.2 million 1985 profit set a record, and for the seventh year in a row the bank was able to raise its cash dividend, then send its shareholders one share of stock for each one they owned.

Why does the bank's profitability have little to do with its ability to send shareholders one share of stock for each one they owned? How much are these extra shares worth to stockholders?

4. Eugene Fama has argued that the best predictor of future interest rates is current interest rates; for example, the interest rate on 1-year Treasury zeros a year from now will be the same as it is today. Suppose that the interest rates on 1-, 2-, and 3-year Treasury zeros are 1.0%, 1.8%, and 2.0%, and you are going to buy one of these three zeros and *hold it for one year*. (If equations are needed, you must show these equations, but do not solve them.)

    a. If the Expectations Hypothesis is correct, which of these three zeros has the highest expected return?

    b. If Fama's theory is correct, which of these three zeros has the highest expected return?

5. In 2012, Alan Sloan warned that, "Municipal bonds are a train wreck waiting to happen."

    Let's look at a security that I own: a New Jersey transit trust fund bond bought at about face value when it was issued four years ago. This bond, which pays 5.25% annual interest and is due in June 2023, currently trades for 120.505% of face value, according to the most recent Bloomberg quote. On the surface, its yield looks pretty good in these ultra-low-rate days: 4.36%. You get that by dividing the 5.25 of interest by the bond's market value of 120.505....

    New Jersey has the right to redeem the bond at face value in June 2018, less than six years from now. If rates remain anywhere near their current levels in 2018, this bond will be redeemed fast enough to break the sound barrier. That produces some sorry math: Pay the aforementioned $12,051 for your bond, get redeemed out for $10,000 in 2018, and your "yield to worst," as it's known, is 1.66%. Yechhhh!

    a. Why is the yield to maturity if the bond is held for 11 years not 4.36%?

    b. What is the correct value of the yield to maturity?

    c. Show how to calculate the yield to call if the bond is called at par in 6 years.

6. In a Graduated Payment Mortgage (GPM), the monthly payments are initially low and then grow over time. For example, the monthly payments on a 30-year $400,000 GPM with a 6% APR might be constant the first year, and then increase by 5% every 12 months.
   a. What is the value of the monthly payment the first year?

   b. Is the duration of a 30-year GPM larger, smaller, or the same as the duration of a conventional amortized loan with constant monthly payments?

7. A famous stock adviser once argued that a conspiracy between stock specialists and bankers is suggested by the fact that "When you're having a decline in stock prices you can always anticipate an increase in interest rates." What he apparently meant is that when market makers lower stock prices so that insiders can accumulate stocks cheaply, banks raise interest rates so that the public cannot borrow money to purchase stocks at these bargain prices. Provide a reasonable non-conspiratorial explanation for the observation that a drop in stock prices is often accompanied by an increase in interest rates.

8. Irving Fisher compared the 1929 stock market crash to a run on a bank that had issued paper bank notes whose value exceeded the gold in its vaults. In his analogy, the bank was U.S. industry, the bank's paper money was stock, and the bank's real assets were the country's factories and machines. Explain why this is not an apt analogy.

9. In 2008, *Fortune* magazine reported that, in the aggregate, the nation's five largest investment banks (Bear Stearns, Goldman Sachs, Lehman Brothers, Merrill Lynch, and Morgan Stanley) had a leverage ratio of 40 to 1. What rate of return on assets would cause their rate of return on equity to be -100%?

10. A Los Angeles mortgage broker said that he would not finance his own home with an adjustable-rate mortgage because, "I don't want to throw the dice and get burned." In what sense is a fixed-rate mortgage also a throw of the dice? What is a losing roll?