Midterm Answers

1. The present value equation is

$$\$223 = \$13.8 + \frac{\$13.8}{(1+R)^1} + \frac{\$13.8}{(1+R)^2} + \ldots + \frac{\$13.8}{(1+R)^{28}}$$

The solution is 4.84%.

2. [http://finance.yahoo.com/blogs/the-exchange/icahn-plans-apple-unlikely-help-long-term-shareholders-181943487.html] The missing words are "the tax code," because the substitution of debt for equity can create a tax shield. The blog goes on:

> Interest on bonds is tax deductible and interest rates, though they have risen recently, remain at historically low levels.
> "Apple should easily be able to sell tens of billion dollars more bonds," Yook says. "Apple can enjoy the tax shields of debt financing and lower cost of capital, among other benefits, without facing any significant issues."

Great products are always great, but have nothing to do with the success of the buyback program since Apple would not be raising money to develop new products.

3. A company can always split its stock, regardless of its profitability. According to the conservation of value principle, stockholders do not benefit: they have twice as many shares, but each share is worth half as much as previously.

4. a. If the Expectations Hypothesis is correct, each zero has the same expected return—since the Expectations Hypothesis assumes that they are priced to give the same expected return.

   b. Let the respective interest rates be R_1, R_2, and R_3. A \$1 investment in the 1-year zero will be worth $1 + R_1 = \$1.01$. A \$1 investment in the 2-year zero will be worth $(1 + R_2)^2$ after two years and $\dfrac{(1+R_2)^2}{1+R_1^{+1}}$ after one year, where R_1^{+1} is the 1-year rate one year from now. If Fama's theory is correct, the 1-year rate one year from now will be 1.0%, the current 1-year rate. So, one year from now, a \$1 investment in the 2-year zero will be worth $\dfrac{(1+R_2)^2}{1+R_1^{+1}} = \dfrac{1.018^2}{1.010} = 1.026$. Similarly, one year from now, a \$1 investment in the 3-year zero will be worth $\dfrac{(1+R_3)^3}{(1+R_2^{+1})^2} = \dfrac{1.020^3}{1.018^2} = 1.024$. The 2-year zero has the highest expected return.

5. [Allan Sloan, "Why You Shouldn't Buy My Overpriced Munis," Fortune, December 24, 2012, p. 41.]

   a. 4.36% is the coupon yield.

   b. The yield to maturity is the value of R that solves this equation:

$$\$12,050.50 = \frac{\$525/2}{(1+R/2)^1} + \frac{\$525/2}{(1+R/2)^2} + \ldots + \frac{\$525/2}{(1+R/2)^{22}} + \frac{\$10,000}{(1+R/2)^{22}}$$

   The solution is 3.05%. Sloan reported the correct yield to maturity:

However, you're not going to get 4.36% on the bond. Why? Because New Jersey is scheduled to redeem it, at 100% of face value, less than 11 years from now. Buy a $10,000 bond for $12,051 today, and in 2023 you'll get back $2,051 less than you paid. That offsets a good part of the interest you'll get over the bond's remaining life. By Bloomberg's math, your "yield to maturity" is only 3.05%. A heck of a lot less than 4.36%.

c. The yield to call is the value of R that solves this equation. The value is 1.66%.

$$\$12,050.50 = \frac{\$525/2}{(1+R/2)^1} + \frac{\$525/2}{(1+R/2)^2} + \ldots + \frac{\$525/2}{(1+R/2)^{12}} + \frac{\$10,000}{(1+R/2)^{12}}$$

6. a. The present value of the monthly payment is equal to the amount borrowed:

$$\$400,000 = \sum_{t=1}^{12} \frac{X}{(1+0.06/12)^t} + \sum_{t=13}^{24} \frac{X(1.05)^1}{(1+0.06/12)^t} + \sum_{t=25}^{36} \frac{X(1.05)^2}{(1+0.06/12)^t} + \ldots + \sum_{t=336}^{360} \frac{X(1.05)^{29}}{(1+0.06/12)^t}$$

The solution works out to be X = $1,341.02.

b. Because the payments grow over time, the duration is longer for a 30-year GPM than for a conventional 30-year amortized loan.

7. Fundamental analysis tells us that an increase in interest rates raises shareholder required returns, reducing the present value of a given cash flow. Rather than a drop in stock prices causing interest rates to increase, it is more plausible that an increase in interest rates causes stock prices to decline.

8. The stock exchanges are a secondary market. Unlike depositors withdrawing money from a bank, stockholders who sell their shares do not constitute a run on industries, because businesses are not obligated to redeem these shares.

9. [Shawn Tully, "What's Wrong with Wall Street and How to Fix It," *Fortune*, April 14, 2008.] With 40-1 leverage, the percentage return on equity is 40 times the percentage return on assets. Therefore, a 2.5% loss on their assets would result in a -100% return on equity.

10. A fixed-rate mortgage is a wager that that interest rates will not decline (a losing roll), leaving the homeowner with a high-interest mortgage, and expensive prepayment penalties and other expenses to refinance at lower rates.