

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 the test score.

1. Briefly explain the practical implications of each of these Warren Buffet quotations. For example, for the quotation, “In the business world, the rearview mirror is always clearer than the windshield,” the answer might be: It is always easier to see what has happened in the past than to see what lies ahead.
 - a. Our favorite holding period is forever.
 - b. Be fearful when others are greedy and greedy only when others are fearful.
 - c. The term “institutional investor” is becoming one of those self-contradictions called an oxymoron, comparable to “jumbo shrimp,” “lady mud wrestler” and “inexpensive lawyer.”
 - d. May you live until Berkshire splits.
 - e. A stock is a disguised bond.
2. In 2010, \$20 million was spent to refurbish the Empire State Building, including the replacement of 6,500 windows with energy efficient windows. It was estimated that this refurbishing will reduce energy usage by 38% and save \$4.4 million in energy costs in the year after the project is completed. Make a rough estimate of the long run annual rate of return from this \$20 million investment.

3. Consider these two companies:

	Company A	Company B
total revenue (millions)	25	50
operating expenses (millions)	10	20
taxes (millions)	5	10
net after-tax income (millions)	10	20
dividends (millions)	4	8
retained earnings (millions)	6	12
rate of return on assets	10%	10%
shareholder's required return	8%	10%
shares outstanding (millions)	20	10

Assume that each firm's dividends, earnings, and assets are all growing at a constant rate. Now the two companies merge, with Company A issuing 30 million shares to take over Company B. After the merger, the two companies operate exactly as before, with no synergies, economies of scale, or reorganization.

a. What are Company A's earnings per share before the merger and after the merger?

b. Who gains or loses from the merger?

4. Use a numerical example to explain this reasoning:

One of the reasons why people get burned in growth stocks—well, one of them is that growth is hard to predict—but the other is that not all growth is created equal. If you are growing without a really good return on invested capital, you're not giving your shareholder any real benefit.

5. Use a hypothetical balance sheet to explain this reasoning:
[Wells Fargo] may be a perfectly well-run bank, but there don't have to be very big errors in the way you are valuing your assets when you are levered 12-1 for it to be disastrous.
6. A portfolio manager wrote that he looks at stocks as infinite-duration bonds with rising coupons.... When you think of it in those terms, you realize they're going to be affected by a rise in interest rates.
If we use the Macauley definition of duration, is the duration of a stock that pays growing dividends forever infinite? Explain your reasoning.
7. In 2010, a portfolio manager wrote that
If you're buying a company that historically looks cheap and it's at 11 or 12 times earnings, that sounds great right now with interest rates where they are. But if the 10-year is at 7%, that might not look so great.
- What does "11 or 12 times earnings" mean?
 - What is the "10-year"?
 - Why might an increase in the 10-year make 11 or 12 times earnings not look so great?

8. Here are some yields on U.S. Treasury zeros and U.S. Treasury coupon bonds:

Maturity (years)	Zeros (%)	Coupon-Bonds (%)
5	1.3	1.2
10	2.8	2.5
15	3.5	2.8
20	3.9	3.1
25	4.1	3.3

How would you explain the fact that the yields on zeros are consistently higher than the yields on coupon bonds? Explain your reasoning in words that would be understood by a novice.

9. Mr. Smith is currently 64 years old. Mr. Smith will receive \$2,365 in monthly Social Security benefits if he begins collecting benefits at age 66 and \$3,208 in monthly benefits if he begins collecting benefits at age 70. (Each of these numbers is in 2009 dollars; Social Security benefits are fully indexed for inflation. If, for example, the CPI increases by 3%, Social Security benefits will increase by 3%.) Would you advise Mr. Smith to begin receiving Social Security benefits at age 66 or 70? [Just set up.]

10. [Continuation] Mr. Smith and his employers paid Social Security taxes of X_t in year t , where t started in 1963. If Mr. Smith retires and begins collecting Social Security benefits at age 66, what was the rate of return on his Social Security contributions? That is, if he had invested the money he and his employers paid to Social Security, what rate of return would he have had to earn to generate the benefits he will get from Social Security? [Just set up.]