

Final Examination (150 minutes)

No textbook or calculators allowed; if calculations are needed, write the explicit equation(s). Do not write “ $Y = aX$; solve for X .” You can write “ $100 = 10X$; solve for X .” The price of extra time is 1 point/minute; e.g., if your test is handed in 5 minutes after the scheduled finish time, 5 points will be subtracted from your test score.

1. On May 7, 2020, the U.S. government reported that the national unemployment rate had jumped from 4.4% in March to 14.7% in April. Yet, the Dow Jones Average went up 0.89% that day and 1.91% the next day. How would you explain this apparent paradox?

2. “Thirty-year zero-coupon bonds will fall three times as far in price as the longest and riskiest [coupon bonds] when interest rates rise.”
 - a. If so, what is the duration of the longest and riskiest coupon bonds?

 - b. Does an increase in the coupon rate increase the duration, reduce the duration, or have no effect on the duration?

3. Here are some data for a hypothetical company that has no debt, has constant annual earnings, and pays out all of its earnings as dividends:
 - Replacement cost of assets per share: \$100
 - Annual earnings per share: \$12
 - Market price of stock: \$150
 - a. What is the shareholders’ required rate of return?

 - b. What is this firm’s leverage?

 - c. What is the value of Tobin’s q ?

4. Identify two very different actions the company in the previous exercise could take that would make their shareholders better off.

5. You own a house with a cost basis of \$1 million and no mortgage. You can sell it now for \$1.8 million net of sale expenses, giving a capital gain of \$800,000. Since this was your family's primary residence for 2 of the last 5 years (the minimum occupancy requirement) and your tax status is married filing jointly, \$500,000 of this \$800,000 capital gain is tax exempt. Alternatively, you can rent the home and receive net after-tax rental income of \$100,000 a year, but you would then lose the \$500,000 capital gains tax-exemption. Show how you would decide between these two alternatives.

6. Smith recently received an offer that would allow him to borrow up to \$150,000 at a 4.99% interest rate with an initial "processing fee" equal to 4.99% of the amount borrowed, which would be immediately deducted from the amount borrowed.
- If this is a conventional monthly amortized loan, what is the effective annual interest rate? (Remember: Just set up; don't try to solve.)
 - If this is a 5-year loan, is the effective annual interest rate larger or smaller than 4.99%?
 - If this is a 5-year loan, is the effective annual interest rate larger or smaller than 5.99%?
 - Would the effective interest rate be higher or lower if the loan were for 10 years instead of 5 years?

7. In January 2020, a *Barron's* associate editor wrote that,

During its latest fiscal year that ended in September, Apple bought back \$67 billion in stock and paid out \$14 billion in dividends. The shares, which rose \$2.37, or 0.8%, to \$299.80 on Monday, trade just below the record high of \$300 set on Jan. 2....

Apple could take a more-balanced approach and double its dividend while cutting back the annual buyback program by \$15 billion to around \$52 billion. That would result in a 2% dividend yield, in line with that of the S&P 500 index.

What disadvantages do you see from increasing dividends and reducing buybacks?

8. A *Business Insider* story revealed how a “math teacher earned \$114,000 trading stocks with low-risk strategy.” Steve Chen, a Los Angeles middle-school math teacher, noticed that blog posts often talked about how people lost money buying short-term call options. So, he embarked on a strategy [of] buying stock and selling call options on the stock. Explain how this strategy makes money and the downside, if any.

9. ShortBurst pays annual dividends and just paid a dividend of \$1. Analysts believe that shareholders' required return on ShortBurst stock is 10% and they expect ShortBurst's dividend to grow by 10% for 5 years and then grow at a constant rate of 5% a year. Estimate the intrinsic value of ShortBurst stock.

10. Is the duration of a perpetuity paying \$1 a year forever, beginning one year from today, with a required return of 10% closer to

- a. 1 year
- b. 10 years
- c. 20 years
- d. 100 years
- e. infinity

11. What advantages and disadvantages do you see for this investment strategy?

[We use] an investment strategy entirely run by a proprietary and adaptive artificial intelligence system that analyzes data and extracts patterns.... The machine learning process underpinning MIND's investment strategy is known as Deep Neural Network Learning—which is a construct of artificial neural networks that enable the A.I. system to recognize patterns and make its own decisions, much like how the human brain works, but at hyper-fast speeds.

12. Explain:

When stock index futures were first proposed, a number of analysts predicted that at long last there would be an indication of investors' expectations about the future course of the stock market. It was said that the value of such a futures contract would indicate the consensus opinion of investors concerning the future level of the associated index: in times of optimism it might be much higher than the current level of the market, while in times of pessimism it might be much lower.

Such predictions were naive, to say the least.

13. Give persuasive counter-arguments:

- a. "Indianapolis is a terrible place to buy a house, since housing prices only go up 2% to 3% a year."
- b. "The fact that housing prices have risen faster than construction costs shows that housing prices are too high."
- c. "The record level of the Case-Shiller index of housing prices shows that this is a bad time to buy a house."

14. Critically evaluate this advice for firms wishing to increase earnings per share: "As simple as it seems, stock repurchase for publicly held concerns is another way for management to [increase] earnings per share."

15. Give a logical explanation for this argument: "The kind of breathtaking leverage that typically accompanies an LBO [leveraged buyout] can be the best thing that ever happened to a company."

16. L and M are two mature companies that routinely earn a 20% return on their assets. Each has no debt outstanding. Yet L consistently has the smaller price-earnings ratio, currently 8.6 versus M's 11.3. Is there any logical explanation? (Use logic, not numbers.)
17. If Congress were to make dividends a tax-deductible expense for corporations, what effects, if any, would you expect to see on corporate leverage?
18. A JP Morgan study concluded that Trump tweets containing the words *China*, *billion*, *products*, *Democrats*, or *great* had statistically significant effects on 2-year and 5-year Treasury rates. How would you interpret this?
19. A study by the management consulting firm McKinsey separated the companies in the S&P 500 into quintiles based on their return on invested capital (ROIC), a measure of a firm's profitability. For the 100 firms with the highest initial ROICs, the average ROIC over the next 15 years decreased. For the 100 firms with the lowest initial ROICs, the average ROIC over the next 15 years increased. Provide a persuasive explanation other than that successful companies slack off while unsuccessful companies are energized.
20. An October 2021 *New York Times* article titled, *The True Cost of Upgrading Your Phone*, argued that *Let's talk about buying an iPhone for \$1,000. Tim Cook, Apple's chief executive, once compared this eye-popping price tag to buying a cup of coffee a day over a year. No big deal, right? But financial advisers see this differently. By some estimates, an investment of \$1,000 in a retirement account today would balloon to about \$17,000 in 30 years.*
- What rate of return did this calculation assume?
 - Do you agree that the true cost of an iPhone is \$17,000?