

Name:
Section:

Fin 410
Midterm #2
Instructor: Rob Schonlau

This exam is closed-book and closed-note. You should write directly on the exam except for the first 30 True/False questions and 13 multiple choice questions. The last page of the exam contains a copy of the formula sheet.

There are 55 total problems. Some of these problems have multiple parts.

Please do not discuss this exam with students who have not taken the exam.

You are welcome to use a calculator.

For all questions involving numbers please show your work on the exam. If you need to make an assumption to solve a problem then state your assumption clearly.

Good Luck!

– Rob Schonlau

True/False – 1 point each

1. Open end funds issue or redeem shares at net asset value.
2. 12b-1 fees are annual fees charged by a mutual fund to pay for marketing and distribution costs.
3. The term “abnormal return” refers to the rate of return in excess of the risk-free rate.
4. The security characteristic line is a regression line.
5. The ratio of alpha to the standard deviation of residuals from a return model is called the information ratio.
6. When estimating beta we use the average historical market premium in the regression.
7. Under the CAPM, the expected return on a portfolio of high variance will be higher than the expected return on a portfolio with low variance.
8. The CAPM indicates that only systematic risk is rewarded. This means that both diversified and undiversified investors would be indifferent to firm-specific risk when choosing which stocks to buy.
9. The beta of the market portfolio is 1.
10. In comparing the Fama French 3-factor model and the CAPM, one difference between the models is that the 3-factor model does not use “betas”.
11. In comparing the CAPM with both the arbitrage pricing model and the multi-factor models, only the CAPM differentiates between systematic and firm-specific risk.
12. On the plot of the SML the vertical distance from the security market line to a plotted return is called the residual.
13. Assume you run a regression to estimate the beta for Esterline’s stock. After running the regression you observe that the estimated beta is 2.74 with a p-value of .45. This means that there is a 45% probability that the true beta is 2.74 and a 55% probability that the true beta is 0.
14. Mutual funds calculate the NAV throughout the trading day as investors buy and sell from the fund.
15. The term “soft dollars” refers to the value of research services that brokerage houses provide “free of charge” in exchange for the investment manager’s business.
16. Nominal interest rates include both real rates and inflation.
17. A bond’s face value is the same as its par value.
18. “Inverse floaters” are bonds where the coupon rate falls when the general level of interest rates rises.
19. The bond price formula shown below is for the invoice price of the bond.

$$Bond\ value = \left(\sum_{t=1}^T \frac{Coupon}{(1+r)^t} \right) + \frac{Face\ value}{(1+r)^T}$$

20. The current yield is the discount rate that makes the present value of the bond’s payments equal to its price.
21. The reinvestment rate risk for a bond deals with the uncertainty of default in the future that can affect the future bond payments.
22. Zero coupon bonds typically trade at either premiums or discounts in the years leading up to maturity.

23. The following set of accounting ratios are correlated with bond ratings: coverage ratios, leverage ratios, liquidity ratios, profitability ratios.
24. The yield curve is a graph of the yield to maturity of government bonds as a function of the time until their various maturities.
25. According to the expectations hypothesis, inverted yield curves are consistent with the notion that future short term rates are expected to be higher than current short term rates.
26. Within a fixed income portfolio, cash flow matching the assets with the obligations results in an immunized portfolio.
27. Even default-free bonds such as Treasury issues are subject to interest rate sensitivity.
28. The formula for the equity beta from a CAPM-based index model for IBM would be $\frac{Cov(R_{IBM}, R_M)}{\sigma_M \sigma_{IBM}}$ where “R” refers to the excess return and σ_M is the standard deviation in market excess returns and σ_{IBM} is the standard deviation in IBMs excess returns.
29. Beta is the slope of the SML line.
30. An “adjusted beta” equals $(3/4) * (\text{regression beta}) + (1/4)*(1)$.

Multiple choice problems 31-43 (2 points each):

31. As a result of bond convexity, an increase in a bond's price when yield to maturity falls is _____ the price decrease resulting from an increase in yield of equal magnitude.
 - A. greater than
 - B. equivalent to
 - C. smaller than
 - D. The answer cannot be determined from the information given.

32. A pension fund’s liabilities have an average duration of 15 years. The fund is looking at using both 5-year maturity zero-coupon bonds as well as perpetuities to immunize its interest rate risk. How much of its portfolio (in percentage terms) should it allocate to the zero-coupon bonds to immunize its position if there are no other assets funding the plan except for the 5-year zero coupon bonds and the perpetuities? Assume the yield on the perpetuity is 4%.
 - A. 52.4%
 - B. 48.2%
 - C. 33.3%
 - D. 25.2%
 - E. The answer cannot be determined from the information given.

33. Banks and other financial institutions can best manage interest rate risk by _____.
 - A. maximizing the duration of assets and minimizing the duration of liabilities
 - B. minimizing the duration of assets and maximizing the duration of liabilities
 - C. matching the durations of their assets and liabilities
 - D. matching the maturities of their assets and liabilities

34. In the context of a bond portfolio, price risk and reinvestment rate risk exactly cancel out at a time horizon equal to the ____.
- average bond maturity in the portfolio
 - duration of the portfolio
 - difference between the shortest duration and longest duration of the individual bonds in the portfolio
 - average of the shortest duration and longest duration of the bonds in the portfolio
35. A bond has a maturity of 12 years, a duration of 9.5 years, and a yield to maturity of 8%. What is the bond's modified duration?
- 12 years
 - 11.1 years
 - 9.5 years
 - 8.8 years
36. The invoice price of a bond is the ____.
- stated or flat price in a quote sheet plus accrued interest
 - stated or flat price in a quote sheet minus accrued interest
 - bid price
 - average of the bid and ask price
37. Inflation-indexed Treasury securities are commonly called ____.
- PIKs
 - CARs
 - TIPS
 - STRIPS
38. The primary difference between Treasury notes and bonds is ____.
- maturity at issue
 - default risk
 - coupon rate
 - tax status
39. A _____ bond gives the bondholder the right to cash in the bond before maturity at a specific price after a specific date.
- callable
 - coupon
 - puttable
 - Treasury
40. Bonds rated _____ or better by Standard & Poor's are considered investment grade.
- AA
 - BBB
 - BB
 - CCC
41. A zero-coupon bond has a yield to maturity of 5% and a par value of \$1,000. If the bond matures in 16 years, it should sell for a price of _____ today.
- \$458.11
 - \$641.11
 - \$789.11
 - \$1,100.11
42. If the bid and ask quotes for a Treasury bond are listed in the newspaper as 98:09 (bid), 98:13 (ask), the actual price at which you can purchase this bond given a \$10,000 par value is _____.
- \$9,828.12
 - \$9,809.38
 - \$9,840.62
 - \$9,813.42

43. Advantages of ETFs over mutual funds include all but which one of the following?
- A. ETFs trade continuously, so investors can trade throughout the day.
 - B. ETFs can be sold short or purchased on margin, unlike fund shares.
 - C. ETF providers do not have to sell holdings to fund redemptions.
 - D. ETF values can diverge from NAV.

Short Answer Questions

44. Describe what catastrophe bonds are and why firms might want to use them. (2 points)

45. Karen Kay, a portfolio manager at Collins Asset Management, is using intuition from the capital asset pricing model for making recommendations to her clients. Her research department has developed the information shown in the following exhibit. The forecasted returns are based on fundamental analysis.

	Forecasted Return	Standard Deviation	Beta
Stock X	14.0%	36%	0.8
Stock Y	17.0%	25%	1.5
Market index	14.0%	15%	1.0
Risk-free rate	5.0%		

- (a) Calculate the expected return and alpha for each stock. (2 points)
- (b) Identify and justify which stock would be more appropriate for an investor who wants to:
 - i. Add this stock to a well-diversified equity portfolio (2 points)
 - ii. Hold this stock as a single-stock (non-diversified) portfolio. (2 points)

46. What is a “bottom-up” beta as discussed during lecture? You don’t need to include any formulas in your explanation but you should be sure to (1) clearly explain what assumptions go into the calculations, and (2) to indicate when a bottom up beta might be appropriate. (3 points)
47. The Closed Fund is a closed-end investment company with a portfolio currently worth \$200 million. It has liabilities of \$3 million and 5 million shares outstanding.
- a. What is the NAV of the fund? (2 points)

 - b. If the fund sells for \$36 per share, what is its premium or discount as a percent of NAV? (2 points)
48. You are considering an investment in a mutual fund with a 4% load and an expense ratio of .5%. You can invest instead in a bank CD paying 6% interest. If you plan to invest for two years, what annual rate of return must the fund portfolio earn for you to be better off in the fund than in the CD? Assume annual compounding of returns. (3 points)
49. Assume you have an estimate of the standard deviation in weekly returns and it is 0.12. What is the *approximate* annualized standard deviation? Assume that you can use the approximation method described in the Darden case questions. (3 points)

50. In class (and in the textbook) we talked about the value of having a model of excess returns. In the lecture I suggested to you that one of the reasons a model is valuable is because you can then ask model-based questions about the expected return and the variance of the returns. Assume the model of excess returns is as follows:

$$R_j = \alpha_j + \beta_j R_M + e_j \text{ with } \text{Cov}(e, R_M) = 0.$$

a. What is the model-based $E[R_j]$? (1 point)

b. What is the model-based variance of R_j ? After writing the expression for the variance be sure to identify the expression for systematic and firm-specific risk. (2 points)

c. If this model were used in a regression, how would you write an expression for R-square? Be sure to answer part c using notation based on the model and not just in words. (2 points)

51. List and briefly describe one of the factors from the Fama-French 3 factor model not included in the CAPM. (2 points)

52. What is the beta of your portfolio if you hold 50% of your wealth in US T-bills and 50% in S&P500? (2 points)

53. Draw the figures (with labeled axis) that showcase the following terms: CAL, CML, efficient frontier, SML, alpha, minimum variance portfolio, tangent portfolio, security characteristic line, intercept, regression line, beta, R-square, Sharpe ratio, risk free rate, standard deviation. Be sure to 1) label these terms on the figures or to underline them in the written explanation so that we can easily find the terms when grading, and (2) show the formulas for the slope and intercepts of any lines that you add to the figures. Draw as few figures as necessary to cover these terms. (12 points)

54. You start work today (Jan 1st) at a new firm for a salary of \$50,000 a year. Assume you get paid at the end of the year. Hence at the end of this year you will see a paycheck for \$50,000. Each year starting next year you are promised a 6% raise. Assume that inflation will be 0% this year, 6% next year, and 9% the following year. What is your nominal salary for the third year? Will the purchasing power of the 3rd year's salary be higher than the purchasing power for your initial year's salary? (3 points)

55. This is your opportunity to write and answer the question you were expecting to see on this exam but that was not asked. Clearly write the question and solution below. To get credit for this question, your question should be (1) clearly worded, (2) not too simple, (3) use topics that we covered in class, and (4) have a clearly worded solution. If you can't think of a good question that is not too simple you are welcome to write 3 simple questions and their solutions. (3 points)

Your question:

Your solution:

Fin 410 Formula Sheet

$$(1+y)/y$$

$$\frac{1+y}{y} - \frac{n}{(1+y)^n - 1}$$

$$\frac{1+y}{y} - \frac{(1+y) + n(c-y)}{c[(1+y)^n - 1] + y}$$

$$PV = \frac{FV}{\left(1 + \frac{r}{m}\right)^{m*n}}$$

$$FV = PV \left(1 + \frac{r}{m}\right)^{m*n}$$

$$PV = \frac{CF}{r}$$

$$PV = \frac{CF_1}{r - g}$$

$$PV = CF \left[\frac{1}{\frac{r}{m}} - \frac{1}{\frac{r}{m} \left(1 + \frac{r}{m}\right)^{m*n}} \right]$$

$$E[r_j] = r_f + \beta_j (E[r_m] - r_f)$$

$$r = \frac{r_1 + r_2 + \dots + r_n}{n}$$

$$D^* = \frac{D}{1+y}$$

$$\frac{\Delta \text{Bond Price}}{\text{Bond Price}} = -D^*(\Delta y) = -\frac{D}{1+y}(\Delta y)$$

$$\text{Value} = \sum_{t=1}^{t=\infty} \frac{CF_t}{(1+r)^t}$$

$$\frac{\Delta \text{Bond Price}}{\text{Bond Price}} = -D^*(\Delta y) + (.5)(\text{Convexity})(\Delta y)^2$$

$$\text{Convexity} = \frac{1}{\text{Price}(1+y)^2} \sum_{t=1}^n \frac{CF_t}{(1+y)^t} (t^2 + t)$$

$$\frac{E[r_p] - r_f}{\sigma_p}$$

$$\sigma_z^2 = a^2 \sigma_x^2 + b^2 \sigma_y^2 + 2ab \sigma_x \sigma_y \rho_{xy}$$

$$E[r] = \sum_{i=1}^n p(r_i) r_i$$

$$r = [(1+r_1)(1+r_2) \dots (1+r_n)]^{1/n} - 1$$

$$(1 + \text{real rate})(1 + \text{inflation rate}) = (1 + \text{nominal rate})$$

$$\text{Var}(r) = \sum_{s=1}^s p(s)(r(s) - E[r])^2 = \sigma^2$$

$$\rho_{sb} = \frac{\text{Cov}(r_s, r_b)}{\sigma_s \sigma_b}$$

$$E[z] = aE[x] + bE[y]$$

$$D = \sum_{t=1}^n t * (w_t) = \sum_{t=1}^n t * \left(\frac{\frac{CF_t}{(1+y)^t}}{\text{Bond Price}} \right)$$

$$\text{ave} \left[\frac{(r-\bar{r})^3}{\sigma^3} \right]$$

$$\text{ave} \left[\frac{(r-\bar{r})^4}{\sigma^4} \right] - 3$$