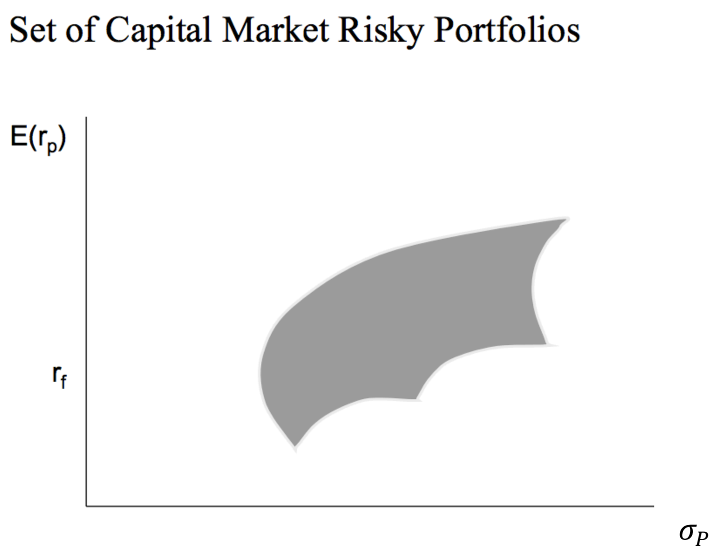
Practice Final
FN 312

Question 1 (Portfolio Theory)

The graph below shows the expected return-standard deviation tradeoffs among portfolios of risky assets. The risk free T-bill has return rf.



a) Indicate the location of the efficient portfolios that are combinations of the risky assets only (excluding the risk free T-bill)
b) On the set of risky asset efficient portfolios, indicate a representative portfolio that would be chosen by a very risk averse investor and a representative portfolio that would be chosen by a risk tolerant investor.
c) Sketch the set of efficient portfolios that are combinations of the risky assets and the risk free T-bill.
d) Using your answer to part (c), briefly explain the mutual fund separation theorem.
e) The annual T-bill rate is 3%, the annual expected return on the S&P 500 index is 8%, and the standard deviation of the annual return on the S&P 500 index is 10%. Determine the portfolio of T-bills and the S&P 500 that achieves an expected return of 10%, and show this portfolio on the graph. What is the standard deviation of the return on this portfolio?

Question 2 (CAPM)

Assume that the T-Bill rate is 4 percent, and the expected return on the market portfolio (e.g. S&P 500) is 12 percent. Using the CAPM, answer the following

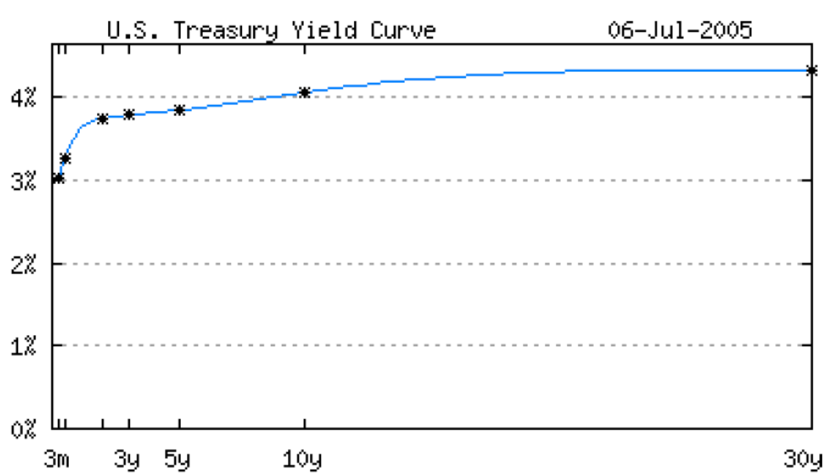
a) Draw a graph showing how the expected return on any asset varies with its beta. What is this relationship called?
b) What is the risk premium on the market portfolio?
c) What is the expected return on an asset with a beta of 1.5?
d) If an investment project with a beta of 0.8 offers an expected return of 9.8 percent, should you do the project? Briefly explain why or why not.
e) If the market expects a return of 11.2 percent from XYZ stock, what is its beta? What does the calculated value of beta imply about the risk characteristics of stock XYZ?

Question 3 (Term Structure)

The following is a list of prices for zero coupon bonds of various maturities:

Maturity (years)	Price of zero coupon bond
1	$943.40
2	$898.47
3	$847.62
4	$792.16

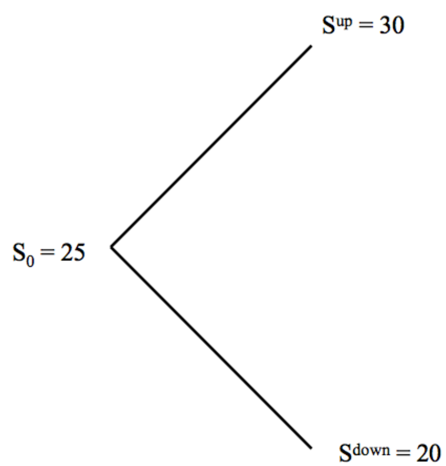
a) Calculate the spot rates for each bond
b) Calculate the implied one-year forward rates
c) Can the price of a zero coupon bond maturing in 5 years be $800. Why or why not?
d) According to the following Treasury yield curve, if the expectations hypothesis of the term structure holds, what does the information in the yield curve say about the course of future interest rates?



e) How would your answer in part d) change if the liquidity premium hypothesis holds instead?

Question 4 (Options)

Consider using the simple binomial model to value one year European call and put options on Starbucks stock with an exercise price of $25. The tree diagram below shows the hypothesized evolution of Starbucks stock over the next year:



Assume that the annual T-bill rate is 3%.

a) At the expiration date of the options, what are the values of the call and the put if the stock price goes up and what are the values if the stock price goes down?
b) What is the current value of the call option?
c) Given the current value of the call option, determine the current value of the put option.
d) What happens to the current values of the call and put options if the T-bill rate rises to 4% per year? Explain why this makes sense.

Question 5 (Options)

a) One-year European call and European put options on Amazon stock, both with an exercise price of $100, currently sell for $10 and $8 respectively. The risk free, annually compounded interest rate is 6 percent. What is the value of the company's stock?
b) Option traders often refer to straddles. Here is an example of a straddle: Buy a call with an exercise price of $100 and simultaneously buy a put with an exercise price of $100. Draw a position diagram for the straddle, showing the payoff and profit at expiration from the investor's net position. What are the breakeven values for the stock price?

c) Why would option traders want to take position in straddles?
d) If the option trader believes that there is a higher chance of a bear market, how can the position in part b. be modified? Explain

Question 6 (Futures and Forwards)

Consider this arbitrage strategy to derive the parity relationship for spreads: (1) enter a long futures position with maturity date T_1 and futures price $F(T_1)$; (2) enter a short position with maturity T_2 and futures price $F(T_2)$; (3) at T_1, when the first contract expires, buy the asset and sell it at time T_2, and (4) borrow $F(T_1)$ dollars at rate r_f and pay back the loan with interest at time T_2.

a) What are the total cash flows to this strategy at times 0, T_1 and T_2?
b) Why must profits at time T_2 ne zero if no arbitrage opportunities are present?
c) What must be the relationship between $F(T_1)$ and $F(T_2)$ for the profits at T_2 to be equal to zero? This relationship is the parity relationship for spreads.

Question 7 (Analytical question on post midterm material)

The Black-Scholes option pricing formula for a European call option on a nondividend paying stock is:

$$C_0 = S_0 N(d_1) - Xe^{-rT} N(d_2)$$

where

$$d_1 = \frac{\ln(S_0/X) + (r + \sigma^2/2)T}{\sigma\sqrt{T}}$$

$$d_2 = d_1 - \sigma\sqrt{T}$$

Explain how the call option value, C_0, depends on the following variables, as well as indicate the direction of the marginal impact of increasing each variable on the call price:

S_0 = Current stock price.

$N(d)$ = The probability that a random draw from a standard normal distribution will be less than d. This equals the area under the normal curve up to d, as in the shaded area of Figure 21.6. In Excel, this function is called NORMSDIST( ).

X = Exercise price.

r = Risk-free interest rate (the annualized continuously compounded rate on a safe asset with the same maturity as the expiration date of the option, which is to be distinguished from r_f, the discrete period interest rate).

T = Time to expiration of option, in years.

σ = Standard deviation of the annualized continuously compounded rate of return of the stock.