SAMPLE EXAM ANSWERS
Finance 34600 – Investment Theory

MULTIPLE CHOICE:

1. B – top down
2. A – 9.03%
3. B – price-weighted index
4. D – ignored
5. D – 25%
6. D – seasoned offer
7. A – $3,100

   The sale proceeds equal $11,500. You place an additional $6,325 in your margin account (55%). When the price increases to $31, you can find the additional cash needed by using the following equation: /

$$0.35 = \frac{11{,}500 + 6325 + X - 500(31)}{500(31)} \longrightarrow X = \$3{,}100$$

8. A – firm commitment
9. B – false
10. C – a single specialist
11. B – false, the specialist participates as buyer or seller in approximately 30% of NYSE trading volume
12. C – short sale
13. A – $57.14
14. A – This is the point that maximizes utility
15. A
16. B – Note that the variance is given as 4%, so the standard deviation equals 0.20.
    E(R) = 0.06 + 0.4(0.15 – 0.06) = 9.6%
    $\sigma = w(\sigma_P) = 0.4(0.2) = 8.0\%$
17. D
18. B – Note that you are given the variance, not the std. dev.
    $\sigma^2 = (0.3)^2(0.25) + (0.7)^2(0.18) + 2(0.3)(0.7)(0.05) = 0.1317$
19. B – A correlation of -1 allows you to create a perfect hedge portfolio
20. A – First-specific risk can be diversified away by investing in a portfolio of securities
21. C – Again, a correlation of -1 allows you to create a perfect hedge portfolio
22. D – Correctly priced securities must lie on the SML (or $\alpha=0$).
23. B

24. C – The market portfolio is the tangency point between the CML and the efficient frontier (this is independent of investor risk preferences)

25. D – The market model equation implies that: $0.09 = 0.03 + \beta(0.15 - 0.03)$ or $\beta_{AMOCO}=0.5$
At the new market forecast, we have: $E(R) = 0.03 + 0.5((0.10 - 0.03) = 6.5\%$.
We could also solve for the expected return by noting that the risk premium on the market decreases by 41.67% (from 12% to 7%). The risk premium on Amoco must drop by the same proportion.

26. B – $E(R) = 0.05 + 1.25(0.12 - 0.05) = 13.75\%$

27. B

28. C – According to CAPM, all correctly-priced securities must lie ON the SML and BELOW the CML.

29. C

30. C

31. D

32. D – This clearly violates semi-strong form efficiency, since stock split announcements are publicly-available information. If semi-strong form efficiency does not hold, then strong form efficiency cannot hold.

33. D – The Sharpe measure (and the M^2 measure) are based on total risk. These measures are appropriate in this case, since there is only one portfolio manager handling the entire investment and there will be no further ability to reduce firm-specific risk.

34. B – A positive alpha implies that the security is above the SML. It is therefore underpriced and is earning a higher expected return than that predicted by CAPM.

35. D – A positive coefficient on squared excess market returns will result in an upward-curving security characteristic line. This suggests that beta (or sensitivity to market returns) is high when the market is performing well.

36. A

37. B – The forward rate can be calculated as follows: $1+f = (1+1.043)^5/(1+1.041)^4 = 1.05104$
The forward rate is therefore equal to 5.1%.

38. C – Lower coupon bonds and higher maturity bonds are more sensitive to interest rate changes.

39. A – You should be willing to pay a price equal to the present value of the future cash flows, or:
$\$1{,}000/(1.03)^{16} = \$623.17$

40. C – Based on our duration formula, the change in the bond price is given by:
$\Delta B = -D(B)(\Delta Y/(1+Y)) = -3.5(985)(-0.01/1.10) = +\$31.34$, so the new bond price equals:
$\$985 + \$31.34 = \$1{,}016.34$.

41. D

42. A – According to put-call parity, $P = C - S + PV(X) = 3.50 - 41.75 + (40/1.04) = \$0.2115$

43. B

PROBLEMS:

1. a) The price-weighted index has a value of (25+42.5)/2 = 33.75 on day 1 and (22.5+40)/2 = 31.25 on day 2. The return is therefore (31.25 – 33.75)/33.75 = -7.41%. We could also get this by taking a weighted average of the returns on the two stocks, or:

$$\left(\frac{25}{67.5}\right)(-10\%)+\left(\frac{42.5}{67.5}\right)(-5.88\%)=-7.41\%$$

b) Again, we can take a weighted average of the returns on the two stocks, except we now use equal weights:

$$\left(\frac{1}{2}\right)(-10\%)+\left(\frac{1}{2}\right)(-5.88\%)=-7.94\%$$

2. a) The total value of the position starts at $7500 (75*100) and ends at $6750 (75*90). Because this is a short position, this $750 change in value is a positive return to you. Since you initially invest 50% of the position, your initial investment is $3750. The return on the short position is therefore:

Return = 750/3750 = 20%

We could also get this return by taking the return on the stock and multiplying it by the magnification factor (or the inverse of the margin rate used) and recognizing that a negative stock return results in a positive return on the short position:

Return = (10%)(1/0.5) = 20% or

b) $$0.30=\frac{7500+3750-75P}{75P}\longrightarrow P=\$115.39$$

3. a) The position has a beginning value of $17,500 (175*100) and an ending value of $18,000 (180*100). If you use the full amount of margin allowed (60%), your initial investment will be $10,500 in your margin account. The return on your investment is therefore equal to: [(18000-17500)/10500] = 4.76%.

We could also find this answer by taking the return on the stock (2.857%) and multiplying it by the magnification factor (the inverse of the margin rate). This gives: [2.857% *(1/.6)] = 4.76%.

b) Of the initial investment, you invested $10,500 and you borrowed $7,000 from your broker. Plugging this loan amount into the margin formula gives:

$$0.40=\frac{100P-7000}{100P}\longrightarrow P=\$116.67$$

4. a) The reward-to-variability ratios are 0.8571 for Buckeye and 0.3636 for Wolverine. You should choose Buckeye.

b) Based on Rule 1, E(R) = 0.20 = 0.08 + w(0.20 – 0.08) or w = 1.1667
This is a margin position, where you borrow 16.67% of your initial investment at the risk-free rate and use this to take a margin position of 116.67% in the Buckeye Fund.

c) Using Rule 1* and Rule 2*, we get E(R)=16.8% and the standard deviation=9.86%

5. a) Mean Returns:

$$Mean_A = (.12 + .09 + .15 + .05 - .03)/5 = 7.6\%$$

$$Mean_B = (.08 + .16 + .25 + .03 + .10)/5 = 12.4\%$$

b) Standard Deviations:

$$Variance_A = \frac{(.12 - .076)^2 + (.09 - 076)^2 + (.15 - .076)^2 + (.05 - .076)^2 + (-.03 - .076)^2}{5} = 0.003904$$

$$StdDev_A = \sqrt{.003904} = 6.25\%$$

$$Variance_B = \frac{(.08 - .124)^2 + (.16 - .124)^2 + (.25 - .124)^2 + (.03 - .124)^2 + (.10 - .124)^2}{5} = 0.005704$$

$$StdDev_B = \sqrt{.005704} = 7.55\%$$

c) Covariance:

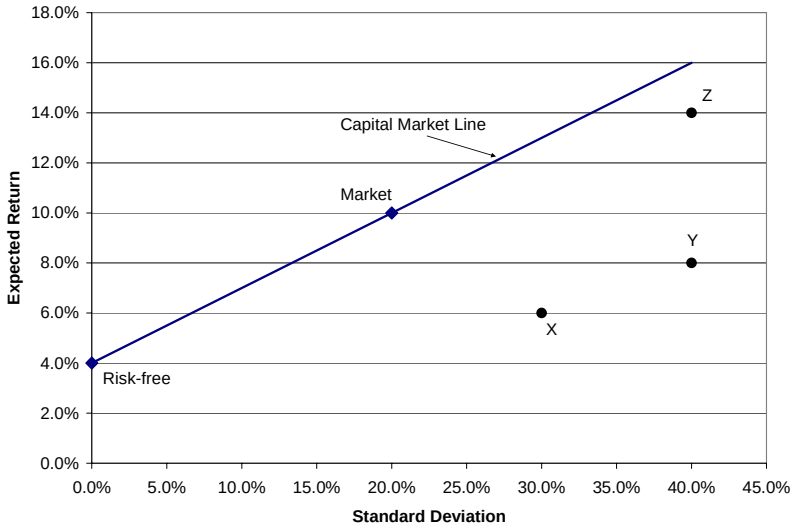
$$Cov_{A,B} = \frac{(.12 - .076)(.08 - .124) + (.09 - .076)(.16 - .124) + (.15 - .076)(.25 - .124) + (.05 - .076)(.03 - .124) + (-.03 - .076)(.10 - .124)}{N}$$

$$= 0.002576$$

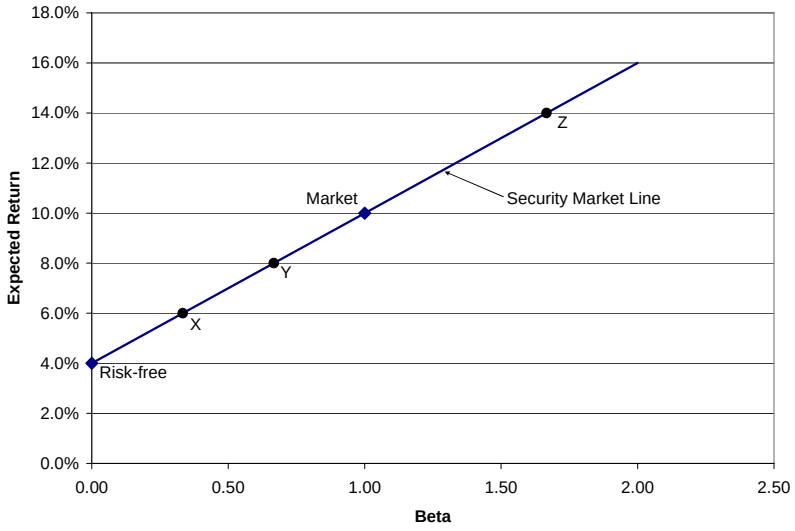
d) Correlation:

$$Correlation_{A,B} = \rho_{A,B} = \frac{.002576}{(.0625)(.0755)} = 0.5459$$

6. a) The CML should be drawn on an expected return-standard deviation graph. Assuming CAPM holds, all correctly-priced securities must lie below the CML.



The SML should be drawn on an expected return-beta graph. Assuming CAPM holds, all correctly-priced securities must lie exactly on the SML.



b) False - We need to look at portfolio risk (beta). This statement would be true if we cared only about total risk.

7. a) Sharpe (Acorn) = 0.3466, Treynor (Acorn) = 0.0338

Sharpe (Hartwell) = 0.3057, Treynor (Hartwell) = 0.0259

Sharpe (Scudder) = 0.0841, Treynor (Scudder) = 0.0102

The rankings are Acorn - 1, Hartwell - 2, Scudder - 3.

These rankings are consistent across both measures, but they do not have to be. The rankings could be inconsistent, since the Sharpe and Treynor measures are based on different risk measures.

b) He has not adjusted for risk. After adjusting for either total or market risk, I would prefer Acorn Fund.

8. This immunization problem is very similar to the one we will work through in class.

(a) The price of the 5-year 10% coupon bond is:

$$B_5 = 100\left[\frac{1-(1.08)^{-5}}{.08}\right] + 1000\left[\frac{1}{(1.08)^5}\right] = \$1{,}079.85$$

The price of the 10-year zero coupon bond is:

$$B_{30} = 1000\left[\frac{1}{(1.08)^{10}}\right] = \$463.19$$

(b) The duration of the 5-year 10% coupon bond is:

$$D = \left(\frac{1.08}{.08}\right) - \left(\frac{1.08 + 5(.10 - .08)}{.10(1.08^5 - 1) + .08}\right) = 4.2035 \ \textit{years}$$

The duration of the zero coupon bond is equal to its maturity or 10 years.

(c) You need to choose your weights in the two securities such that your portfolio duration equals the duration of your liability or 7 years.

$$7 = w_5(4.2035) + (1 - w_5)(10)$$

or $w_5 = 51.755\%$ and $w_{10} = 48.245\%$

Our total investment must equal the present value of the \$1 million liability, or:

$$\frac{1{,}000{,}000}{(1.08)^7} = \$583{,}490.40$$

We therefore need to invest (583,490.40)(.51755)=\$301,987.79 in the 5-year bonds and (583,490.40)(..48245)=\$281,502.61 in the 10-year zero coupon bonds.

Given these investment requirements, we need to purchase 279.66 5-year bonds (or \$301,987.79/\$1,079.85) and 607.75 10-year bonds (or \$281,502.61/\$46319). This position will provide us with a value of approximately \$1,000,000 seven years from today regardless of what happens to interest rates.

9. (a) Given the prices listed in the problem, the total position will cost us:

S + 2(P) – C = 34.75 + 17.00 -3.75 = \$48.00

Our payoffs and profits are therefore equal to:

Stock Price	Position Payoffs			Total Payoffs	Profit
	Buy Stock	Buy 2 Puts	Write 1 Call		
0	0	80	0	80	32
10	10	60	0	70	22
20	20	40	0	60	12
30	30	20	0	50	2
40	40	0	0	40	-8
50	50	0	-10	40	-8
60	60	0	-20	40	-8

(b) The payoff diagram associated with this position is shown below.