Solution key HW#1

CHAPTER 1: THE INVESTMENT ENVIRONMENT

PROBLEM SETS

14. Treasury bills serve a purpose for investors who prefer a low-risk investment. The lower average rate of return compared to stocks is the price investors pay for predictability of investment performance and portfolio value.

15. With a "top-down" investing style, you focus on asset allocation or the broad composition of the entire portfolio, which is the major determinant of overall performance. Moreover, top-down management is the natural way to establish a portfolio with a level of risk consistent with your risk tolerance. The disadvantage of an *exclusive* emphasis on top-down issues is that you may forfeit the potential high returns that could result from identifying and concentrating in undervalued securities or sectors of the market.

    With a "bottom-up" investing style, you try to benefit from identifying undervalued securities. The disadvantage is that you tend to overlook the overall composition of your portfolio, which may result in a non-diversified portfolio or a portfolio with a risk level inconsistent with your level of risk tolerance. In addition, this technique tends to require more active management, thus generating more transaction costs. Finally, your analysis may be incorrect, in which case you will have fruitlessly expended effort and money attempting to beat a simple buy-and-hold strategy.

CHAPTER 2: ASSET CLASSES AND FINANCIAL INSTRUMENTS

PROBLEM SETS

12. a. Total market value at t = 0 is: ($9,000 + $10,000 + $20,000) = $39,000

    Total market value at t = 1 is: ($9,500 + $9,000 + $22,000) = $40,500

    Rate of return = ($40,500/$39,000) – 1 = 3.85%

    b. The return on each stock is as follows:

    $r_A = (95/90) – 1 = 0.0556$

    $r_B = (45/50) – 1 = –0.10$

    $r_C = (110/100) – 1 = 0.10$

    The equally-weighted average is:

    [0.0556 + (-0.10) + 0.10]/3 = 0.0185 = 1.85%

22. A call option conveys the *right* to buy the underlying asset at the exercise price. A long position in a futures contract carries an *obligation* to buy the underlying asset at the futures price.

CHAPTER 5: INTRODUCTION TO RISK, RETURN, AND THE HISTORICAL RECORD

PROBLEM SETS

6. a. The "Inflation-Plus" CD is the safer investment because it guarantees the purchasing power of the investment. Using the approximation that the real rate equals the nominal rate minus the inflation rate, the CD provides a real rate of 1.5% regardless of the inflation rate.

   b. The expected return depends on the expected rate of inflation over the next year. If the expected rate of inflation is less than 3.5% then the conventional CD offers a higher real return than the Inflation-Plus CD; if the expected rate of inflation is greater than 3.5%, then the opposite is true.

   c. If you expect the rate of inflation to be 3% over the next year, then the conventional CD offers you an expected real rate of return of 2%, which is 0.5% higher than the real rate on the inflation-protected CD. But unless you know that inflation will be 3% with certainty, the conventional CD is also riskier. The question of which is the better investment then depends on your attitude towards risk versus return. You might choose to diversify and invest part of your funds in each.

   d. No. We cannot assume that the entire difference between the risk-free nominal rate (on conventional CDs) of 5% and the real risk-free rate (on inflation-protected CDs) of 1.5% is the expected rate of inflation. Part of the difference is probably a risk premium associated with the uncertainty surrounding the real rate of return on the conventional CDs. This implies that the expected rate of inflation is less than 3.5% per year.

10. (a) With probability 0.9544, the value of a normally distributed variable will fall within two standard deviations of the mean; that is, between –40% and 80%.

CHAPTER 6: RISK AVERSION AND CAPITAL ALLOCATION TO RISKY ASSETS

PROBLEM SETS

6. Points on the curve are derived by solving for E(r) in the following equation:

$$U = 0.05 = E(r) - 0.5A\sigma^2 = E(r) - 1.5\sigma^2$$

The values of E(r), given the values of σ^2, are therefore:

σ	σ^2	E(r)
0.00	0.0000	0.05000
0.05	0.0025	0.05375
0.10	0.0100	0.06500
0.15	0.0225	0.08375
0.20	0.0400	0.11000
0.25	0.0625	0.14375

The bold line in the graph on the next page (labeled Q6, for Question 6) depicts the indifference curve.

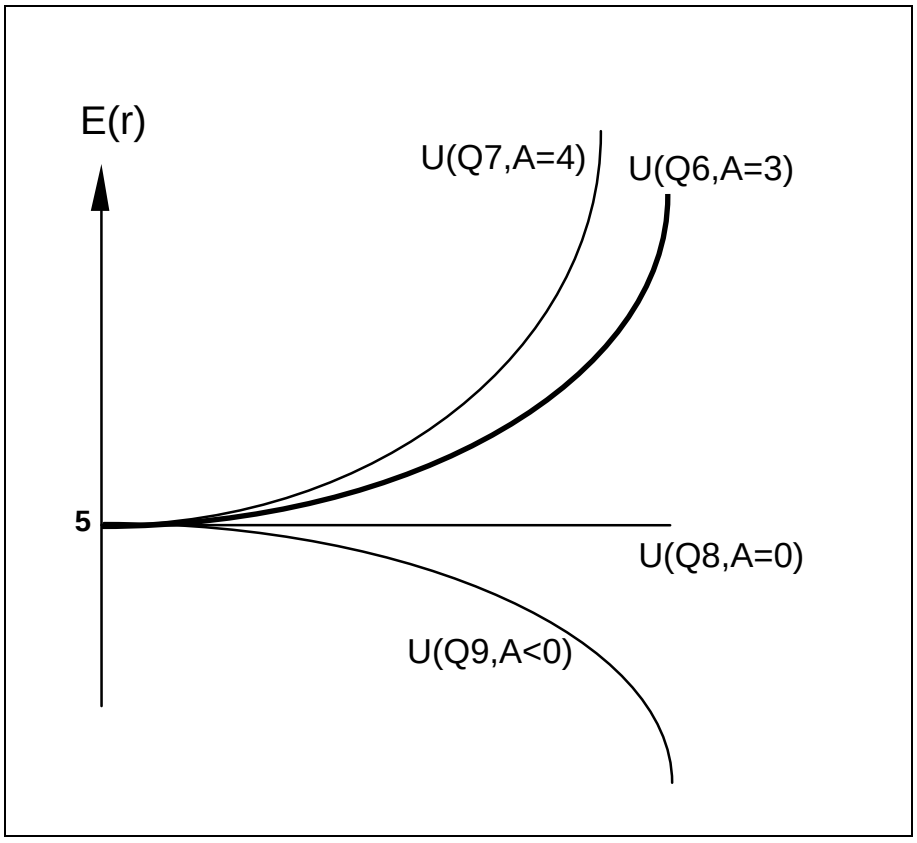
7. Repeating the analysis in Problem 6, utility is now:

$$U = E(r) - 0.5A\sigma^{2} = E(r) - 2.0\sigma^{2} = 0.05$$

The equal-utility combinations of expected return and standard deviation are presented in the table below. The indifference curve is the upward sloping line in the graph on the next page, labeled Q7 (for Question 7).

σ	σ^2	E(r)
0.00	0.0000	0.0500
0.05	0.0025	0.0550
0.10	0.0100	0.0700
0.15	0.0225	0.0950
0.20	0.0400	0.1300
0.25	0.0625	0.1750

The indifference curve in Problem 7 differs from that in Problem 6 in slope. When A increases from 3 to 4, the increased risk aversion results in a greater slope for the indifference curve since more expected return is needed in order to compensate for additional σ.



8. The coefficient of risk aversion for a risk neutral investor is zero. Therefore, the corresponding utility is equal to the portfolio's expected return. The corresponding indifference curve in the expected return-standard deviation plane is a horizontal line, labeled Q8 in the graph above (see Problem 6).

9. A risk lover, rather than penalizing portfolio utility to account for risk, derives greater utility as variance increases. This amounts to a negative coefficient of risk aversion. The corresponding indifference curve is downward sloping in the graph above (see Problem 6), and is labeled Q9.

13. Expected return = (0.7 × 18%) + (0.3 × 8%) = 15%
Standard deviation = 0.7 × 28% = 19.6%

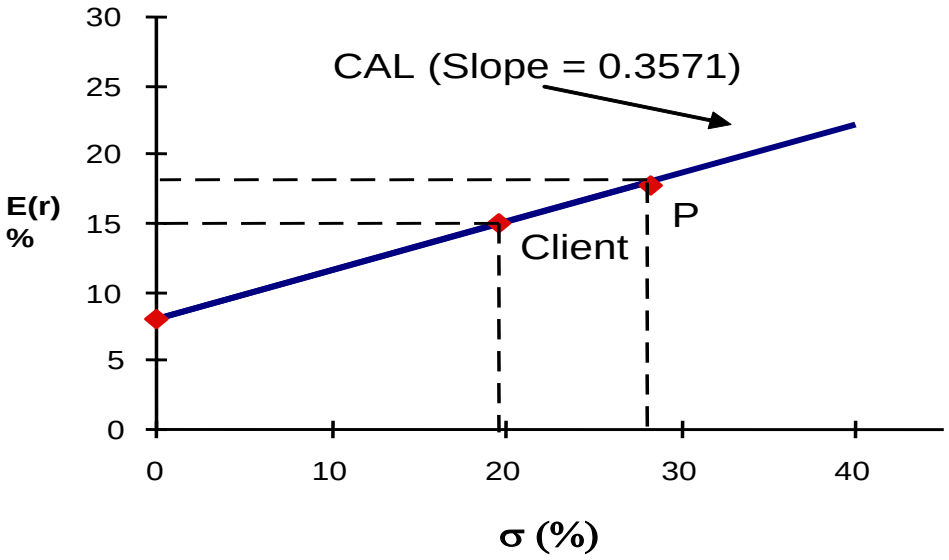
14. Investment proportions: 30.0% in T-bills

0.7 × 25% = 17.5% in Stock A
0.7 × 32% = 22.4% in Stock B
0.7 × 43% = 30.1% in Stock C

15. Your reward-to-volatility ratio: $S = \frac{.18 - .08}{.28} = 0.3571$

Client's reward-to-volatility ratio: $S = \frac{.15 - .08}{.196} = 0.3571$

16.



17. a. $E(r_C) = r_f + y \times [E(r_P) - r_f] = 8 + y \times (18 - 8)$

If the expected return for the portfolio is 16%, then:

$$16\% = 8\% + 10\% \times y \Rightarrow y = \frac{.16 - .08}{.10} = 0.8$$

Therefore, in order to have a portfolio with expected rate of return equal to 16%, the client must invest 80% of total funds in the risky portfolio and 20% in T-bills.

b.

Client's investment proportions:	20.0% in T-bills
0.8 × 25% =	20.0% in Stock A
0.8 × 32% =	25.6% in Stock B
0.8 × 43% =	34.4% in Stock C

c. $\sigma_C = 0.8 \times \sigma_P = 0.8 \times 28\% = 22.4\%$

18. a. $\sigma_C = y \times 28\%$

If your client prefers a standard deviation of at most 18%, then:

y = 18/28 = 0.6429 = 64.29% invested in the risky portfolio

b. $E(r_C) = .08 + .1 \times y = .08 + (0.6429 \times .1) = 14.429\%$

19. a. $y^* = \frac{E(r_P) - r_f}{A\sigma_P^2} = \frac{0.18 - 0.08}{3.5 \times 0.28^2} = \frac{0.10}{0.2744} = 0.3644$

Therefore, the client's optimal proportions are: 36.44% invested in the risky portfolio and 63.56% invested in T-bills.

b. $E(r_C) = 8 + 10 \times y^* = 8 + (0.3644 \times 10) = 11.644\%$

$\sigma_C = 0.3644 \times 28 = 10.203\%$