1. What is an expected value?

   The sum of each outcome times the probability of occurrence. This value represents the central tendency of the distribution. It is best described as a weighted average where the weights are the probabilities.

2. Why do investors hold portfolios of assets instead of plunging in a single asset, for example into the asset with the highest expected return?

   Investors take risk into consideration. The risk of a portfolio can be less than the risk of an individual asset. This is also an indication that investors do not like risk.

3. Define risk.

   Risk is uncertainty about future outcomes or returns. The greater the dispersion of possible outcomes, the greater the risk.

4. What is the most commonly used measure of risk?

   The variance or the standard deviation.

5. In a two stock portfolio, the portfolio expected return is the weighted average of the expected return of each stock's expected return using the proportions invested in each stock as weights. Is this also true for the portfolio variance?

   No! First, it is not exactly a weighted average, and second, the correlation coefficient plays a large role in determining the exact value of the portfolio variance. Notice in the formula that if it is negative, it is reducing the portfolio variance.

6. What does the correlation coefficient (ρ_{ij}) measure? What are the two most extreme values it can take, and what do they indicate? In the real world, are more variables positively or negatively correlated?

   The correlation coefficient (ρ_{ij}) measures the joint movement between two variables. The extreme values are –1 (perfect negative correlation) and +1 (perfect positive correlation). In the real work, most items are positively correlated.

7. What is the feasible set?

   These are the stocks or portfolios available to investors.

8. What defines the points along the efficient frontier? Do portfolios exist above the efficient frontier?

These are stocks or portfolios that provide the highest expected return given a level of risk. Portfolios do not exist above the efficient frontier.

9. What do indifference curves measure?

They measure risk-expected return tradeoffs for an individual. This would determine the shape of the indifference curve. Along an indifference curve, you should be indifferent between the assets.

10. What does the steepness of the slope of the risk-return indifference curve indicate?

The investor requires an incremental return for each new level of risk. The more risk-averse the investor is, the steeper the slope.

11. Describe the optimum portfolio for an investor in terms of indifference curves and the efficient frontier when there is no risk-free asset.

The optimum portfolio for an investor is where an investor's risk-return indifference curve is tangent to the efficient frontier; that is, the slopes of both curves are equal.

12. What is the "market portfolio"?

If there is a risk-free asset, the market portfolio is the portfolio on line between the risk-free rate and the highest attainable point in the attainable set. It would be the point of tangency of this line and the feasible set. This line is also called the capital market line (CML).

13. The relevant measure of risk of an asset, if we were constrained to hold only single assets, would be the standard deviation of the stock return. What is the relevant measure of risk of an asset if investors are allowed to hold well diversified portfolios?

It would the marginal contribution that the asset will make to the total risk of the portfolio. This is captured by beta.

14. What is the concept of beta? How can we measure it? What does it tell us?

Beta is the covariance of a stock return with the return of the market portfolio. We can measure it using a sample of historic returns of both the individual asset and the market portfolio. If beta is exactly equal to one, the stock moves exactly with the market. If it is greater than one, the stock moves more than the market

portfolio. If less than one, or even negative, it does not correlated with the market.

15. Which model predicts or explains the expected return on a risky stock?

The Capital Asset Pricing Model (CAPM) does this. Given a risk-free rate and a market risk-premium (rate of return on the market and the risk-free rate), we could write down the model in terms of the beta of the stock. The risk-free rate and the market risk premium could change over time. But even at a given time when these variables are constant, the beta of stocks will vary and determine the expected return on each stock. This model is also known as the security market line (SML).

16. What does the security market line indicate? In general terms, how is it different from the capital market line?

The security market line indicates the expected rate of return for each stock as beta varies. If beta is a measure of risk for risky assets held in portfolios, it is beta that determines the expected rate of return for each stock. This is true for all stocks, not just efficient stocks and portfolios.

On the other hand, the capital market line is the line between the risk-free and the market portfolio in the expected return – std. dev. of return space. It shows the relationship between these two variables, but is only valid for efficient portfolios which plot on the line. .

17. What is the beta of the market portfolio? What is the beta of the risk-free asset?

Using the formula for beta, it is easy to show that the beta of a market portfolio is equal to one and the beta of the risk-free asset is zero.

18. What is the difference between systematic risk and unsystematic risk?

Unsystematic risk can be diversified away, while systematic risk can not be eliminated. Unsystematic risk is not compensated for under the capital asset pricing model. Since unsystematic risk is associated with an individual company or industry, it may be diversified away in a large portfolio and is not a risk inherent in investing in common stocks. Thus, there is no risk premium for unsystematic risk.

19. Is it possible to hold a stock and not be compensated by an appropriate expected return for the risk that one obtains by holding this asset?

If you hold it undiversified, you may have some unsystematic risk which could have been diversified away. But the expected return on that asset will only compensate you for the systematic risk of that stock. The stock is not efficient.

