Chapter 3: Modern portfolio theory

Self test questions

1. Which of the following are disadvantages of using variance as risk measure in a financial context?
   (a) It ignores higher moments (e.g. skewness) ☐ True ☐ False
   (b) It gives equal weight to upward and downward deviations from the expectation ☐ True ☐ False
   (c) It can be used in a forward and backward looking way ☐ True ☐ False

2. What is the expected return of a portfolio of assets?
   (a) The sum of the expected asset returns
   (b) The weighted average of the expected asset returns
   (c) The weighted average of the expected asset returns corrected for correlation

3. What is the variance of a portfolio of assets?
   (a) The sum of the asset variances
   (b) The weighted average of the asset variances
   (c) The weighted sum of the asset variances and covariances

4. What is unsystematic risk?
   (a) The risk that disappears through diversification
   (b) Market risk
   (c) The total risk of a poorly diversified portfolio

5. What is systematic risk?
   (a) The risk that disappears through diversification
   (b) Market risk
   (c) The total risk of a poorly diversified portfolio

6. What does the variance of a poorly diversified portfolio measure?
   (a) The risk that disappears through diversification
   (b) Market risk
   (c) The total risk of that portfolio

7. The diversification effect reduces:
   (a) The total risk of a portfolio ☐ True ☐ False
   (b) The systematic risk of a portfolio ☐ True ☐ False
   (c) The unsystematic risk of a portfolio ☐ True ☐ False

8. The diversification effect increases with the number of assets in a portfolio because:

   (a) Asset variances tend to cancel out

   (b) Asset returns tend to cancel out

   (c) The number of covariances increases faster than the number of variances

9. What does the β of a poorly diversified portfolio measure?

   (a) The risk that disappears through diversification ☐ True ☐ False
   (b) Market risk ☐ True ☐ False
   (c) The total risk of a portfolio ☐ True ☐ False

10. What does the β of an individual asset measure?

    (a) The asset's contribution to portfolio variance ☐ True ☐ False
    (b) The asset's sensitivity for changes in portfolio returns ☐ True ☐ False
    (c) The asset's systematic risk ☐ True ☐ False
    (d) The ratio of the asset's covariance with the portfolio to the portfolio variance ☐ True ☐ False

11. Variances are additive (total variance=weighted sum of the variances of the parts) across:

    (a) Assets in a portfolio ☐ True ☐ False
    (b) Projects and activities in a company ☐ True ☐ False
    (c) Debt and equity in a company ☐ True ☐ False

12. βs are additive (total β =weighted sum of the βs of the parts) across:

    (a) Assets in a portfolio ☐ True ☐ False
    (b) Projects and activities in a company ☐ True ☐ False
    (c) Debt and equity in a company ☐ True ☐ False

13. The diversification effect of combining 2 assets is maximal if their correlation coefficient is:

    (a) -1

    (b) 0

    (c) $+1$

14. A company has an equity β of 1.7. This means that:

    (a) The company's *unsystematic* risk is larger than that of the marked as a whole

    (b) The company's *systematic* risk is larger than that of the marked as a whole

    (c) The company's *total* risk is larger than that of the marked as a whole

15. A company has an equity β of 1.7. This means that:

    (a) If the marked goes down by 1% the company's shares will go down by *less* than 1.7%

    (b) If the marked goes down by 1% the company's shares will go down by 1.7%

    (c) If the marked goes down by 1% the company's shares will go down by *more* than 1.7%

16. Markowitz efficient portfolios cannot be replaced by portfolios that:

(a)	Offer a higher expected return for the same risk	☐ True	☐ False
(b)	Offer a higher expected return for a higher risk	☐ True	☐ False
(c)	Offer a lower expected return for a lower risk	☐ True	☐ False
(d)	Offer a lower risk for the same expected return	☐ True	☐ False
(e)	Offer a lower expected return for the same risk	☐ True	☐ False

17. What is the β of a risk free asset?

(a) $\beta = 1$

(b) $\beta = 0$

(c) $\beta = -1$

18. If the market is in equilibrium then:

(a)	All assets are held	☐ True	☐ False
(b)	Demand equals supply	☐ True	☐ False
(c)	There is no excess demand or supply	☐ True	☐ False
(d)	There may be investors who want to invest more at market prices	☐ True	☐ False
(e)	There may be assets that remain unsold at market prices	☐ True	☐ False
(f)	Everybody who invests in risky assets holds a fraction of the market portfolio	☐ True	☐ False
(g)	Two fund separation obtains	☐ True	☐ False

19. In equilibrium, the locus of the market portfolio M is chosen such that:

(a)	It gives the highest possible expected return per additional unit of risk	☐ True	☐ False
(b)	It expresses the average risk aversion in the market	☐ True	☐ False
(c)	It contains all assets in the risky investment universe	☐ True	☐ False
(d)	The Capital Market Line has the steepest possible slope	☐ True	☐ False

20. An individual whose indifference curve has a tangency point with the Capital Market Line to the left of the market portfolio M:

(a) Borrows money risk free to invest more than his own money in risky assets

(b) Invests a fraction of his money in the risk free asset and the rest in risky assets

(c) Only holds a fraction of the market portfolio M

21. An individual whose indifference curve has a tangency point with the Capital Market Line to the right of the market portfolio M:

(a) Borrows money risk free to invest more than his own money in risky assets

(b) Invests a fraction of his money in the risk free asset and the rest in risky assets

(c) Only holds a fraction of the market portfolio M

22. The Capital Market Line depicts the expected return of:

(a) Any investment as a function of its standard deviation

(b) Efficient portfolios as a function of portfolio standard deviation

(c) Any investment as a function of its β

23. The Security Market Line depicts the expected return of:

    (a) Any investment as a function of its standard deviation
    (b) Efficient portfolios as a function of portfolio standard deviation
    (c) Any investment as a function of its β

24. The market price of risk, $(E(r_m) - r_f)/\sigma$, is the price per unit of risk of:

    (a) The Capital Market Line
    (b) The Security Market Line
    (c) Both the Capital Market Line and the Security Market Line

25. The Sharpe ratio:

    (a) Uses total risk (σ) ☐ True ☐ False
    (b) Uses systematic risk (β) ☐ True ☐ False
    (c) Is better suited to evaluate an investor's total portfolio ☐ True ☐ False
    (d) Is better suited to evaluate sub-portfolios ☐ True ☐ False

26. The Treynor ratio:

    (a) Uses total risk (σ) ☐ True ☐ False
    (b) Uses systematic risk (β) ☐ True ☐ False
    (c) Is better suited to evaluate an investor's total portfolio ☐ True ☐ False
    (d) Is better suited to evaluate sub-portfolios ☐ True ☐ False

27. Jensen's alpha:

    (a) Uses total risk (σ) ☐ True ☐ False
    (b) Uses systematic risk (β) ☐ True ☐ False
    (c) Is better suited to evaluate an investor's total portfolio ☐ True ☐ False
    (d) Is better suited to evaluate sub-portfolios ☐ True ☐ False

28. A company has an equity β of 1.7. The risk free rate is 3% and the expected return on the market portfolio is 7.6%. What is the company's expected return on equity?

    (a) 7.82%
    (b) 8.1%
    (c) 10.82%
    (d) 15.92%

29. Markowitz' mean-variance optimization is equivalent to the more general behavioural assertion of expected utility maximization if:

    (a) Asset returns are jointly normally distributed ☐ True ☐ False
    (b) Investors are risk neutral ☐ True ☐ False
    (c) Investors have quadratic utility functions ☐ True ☐ False
    (d) Investors have logarithmic utility functions ☐ True ☐ False

30. Which of the following empirical findings *contradict* the CAPM?

    (a) Smaller firms have higher returns than large firms ☐ True ☐ False
    (b) Risky firms have higher returns than safe firms ☐ True ☐ False
    (c) Value stocks have higher returns than growth stocks ☐ True ☐ False
    (d) The relation between β and return is linear ☐ True ☐ False
    (e) The estimated return when $\beta = 0$ is higher than the risk free interest rate ☐ True ☐ False
    (f) The estimated risk premium $(r_m - r_f)$ is close to zero ☐ True ☐ False

31. An arbitrage strategy is a strategy that:

(a)	Is always riskless	☐ True	☐ False
(b)	Costs nothing today and gives either a positive or zero payoff later	☐ True	☐ False
(c)	Gives a payoff today and no net obligations later	☐ True	☐ False
(d)	Can be very profitable but also involves high risk	☐ True	☐ False
(e)	Profits from mispricing	☐ True	☐ False

32. Arbitrage Pricing Theory (APT):

(a)	Assumes that the market portfolio is efficient	☐ True	☐ False
(b)	Includes size and book-to-market as additional risk factors besides the market risk	☐ True	☐ False
(c)	Only prices systematic risk, not unsystematic risk	☐ True	☐ False
(d)	Allows for other risk factors than the market as a whole	☐ True	☐ False
(d)	Does not specify what, or even how many, risk factors there are	☐ True	☐ False