I. **Multiple Choice (Choose one answer for the multiple choice, 50%)**

1. An on-the-job injury occurs every 20 days on average at an automobile plant in Germany. What is the probability that the next on-the-job injury will occur within 20 days?

(a) 0.3679  
(b) 0.6321  
(c) 0.9512  
(d) 0.0488

\[
e^1=2.7182, \quad e^{-1}=0.3679, \quad e^{-2}=0.1353, \quad e^{-3}=0.0498, \quad e^{-4}=0.0183, \quad e^{-5}=0.0067, \]
\[
e^{-6}=0.0025, \quad e^{-7}=0.0009, \quad e^{-8}=0.0003
\]

2. Stock options are usually awarded at the price of a company’s shares on the date of the grant. A recent study (Awata, E. “Backdated Options May Snare Some Directors”. USA Today, March 29, 2007) found evidence that many outside directors received grants at the lowest price in a given month. Of 17,512 grants before the Sarbanes-Oxley Act tightened Security and Exchange Commission disclosure rules, 1,726 were at the lowest price in a given month. Assume that there is an average of 21 days in a month on which grants can be made. What is the probability that these results or more extreme results (i.e. at least 1,726 options with the lowest price are granted) could occur if the grant is equally likely to be given on any day of the month?

(a) 0  
(b) 1  
(c) 0.3156  
(d) 0.3688

\[P(Z>0.48)=0.3156, \quad P(-0.48<Z<0.48)=0.3688\]

\[P(Z>6.00)=0, \quad P(Z<6.00)=1\]

3. According to the questionnaire, the major reasons of discarding credit cards are as follows:

<table>
<thead>
<tr>
<th>Reason</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charge annual fee</td>
<td>56.0%</td>
</tr>
<tr>
<td>Bad service</td>
<td>30.8%</td>
</tr>
<tr>
<td>High interest rate</td>
<td>24.5%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reason</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charge annual fee and</td>
<td>20.3%</td>
</tr>
<tr>
<td>Bad service</td>
<td>14.5%</td>
</tr>
<tr>
<td>High interest rate and</td>
<td>10.8%</td>
</tr>
<tr>
<td>High interest rate and</td>
<td></td>
</tr>
<tr>
<td>Bad service</td>
<td></td>
</tr>
</tbody>
</table>

Please compute the possibility of discarding credit cards just because of charging annual fee but not due to high interest rate and bad service.

(a) 0.298  
(b) 0.257  
(c) 0.800  
(d) 0.743

4. The Melbourne Department of Transportation maintains statistics for mishandled bags per 1,500 airline passengers. In general, the average number of mishandled bags found in per 1,500 passengers is 3. In 2008, Quick Fly had 5 mishandled bags per 1,500 passengers. What is the...
The probability that in the next 1,500 passengers, Quick Fly will have no mishandled bag?
(a) 0.0067  (b) 0.0498  (c) 0.0565  (d) 0.0431

\[ e^{-1} = 0.3679, \quad e^{-2} = 0.1353, \quad e^{-3} = 0.0498, \quad e^{-4} = 0.0183, \quad e^{-5} = 0.0067, \]
\[ e^{-6} = 0.0025, \quad e^{-7} = 0.0009, \quad e^{-8} = 0.0003 \]

5. If \( X_1, X_2, \ldots, X_{100} \) are i.i.d. \( \chi^2(2) \), and \( P \left[ \sum_{i=1}^{100} X_i \leq k \right] = 0.975 \), please find the value of \( k \).
(a) 239.2  (b) 245.8  (c) 237.6  (d) 238.6

The next five questions are related to the following partial computer output for regression analysis with a dependent variable (\( Y \), the sales price) and independent variables (\( X_1, X_2, \ldots, X_7 \)):

**Table 1** Multiple regression

<table>
<thead>
<tr>
<th>Multiple R</th>
<th>R Square</th>
<th>STD Error of EST</th>
</tr>
</thead>
<tbody>
<tr>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

**Table 2** Analysis of Variance

<table>
<thead>
<tr>
<th></th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>*</td>
<td>30943.647</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Residual</td>
<td>42 *</td>
<td>81.277</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 3** Individual analysis of variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>T statistic for Ho: Parameter=0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-40.3851</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( X_1 )</td>
<td>3.0621</td>
<td>0.3330</td>
<td>*</td>
</tr>
<tr>
<td>( X_2 )</td>
<td>4.8810</td>
<td>4.4439</td>
<td>*</td>
</tr>
<tr>
<td>( X_3 )</td>
<td>11.5530</td>
<td>4.0902</td>
<td>*</td>
</tr>
<tr>
<td>( X_4 )</td>
<td>8.6808</td>
<td>2.7576</td>
<td>*</td>
</tr>
<tr>
<td>( X_5 )</td>
<td>-0.0726</td>
<td></td>
<td>-0.2347</td>
</tr>
<tr>
<td>( X_6 )</td>
<td>3.7491</td>
<td>*</td>
<td>1.1119</td>
</tr>
<tr>
<td>( X_7 )</td>
<td>-3.8691</td>
<td>*</td>
<td>-0.8618</td>
</tr>
</tbody>
</table>
6. The number of observations used in this experiment is:
   (a) 42   (b) 43   (c) 45   (d) 50

7. What proportion of the variation in y can be explained by the model you found from the computer output?
   (a) 90.06%   (b) 92.06%   (c) 94.9%   (d) 96%

8. Suppose you want to test if the model found from the computer output is useful in predicting the sales price. Which of the following is a correct statement regarding the $p$-value for your test?
   (a) $p$-value<0.01   (b) 0.01<$p$-value<0.05   (c) 0.05<$p$-value<0.1
   (d) 0.1<$p$-value<0.5
   $F_{0.1}(7, 42) \approx 1.87, \quad F_{0.05}(7, 42) \approx 2.25, \quad F_{0.01}(7, 42) \approx 2.62$

9. In relation to the above test, choose the correct statement.
   (a) $H_0: \beta_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$
   (b) $H_0: \beta_0 \neq \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq 0$
   (c) $H_0: \hat{\beta}_1 = \hat{\beta}_2 = \hat{\beta}_3 = \hat{\beta}_4 = \hat{\beta}_5 = \hat{\beta}_6 = \hat{\beta}_7 = 0$
   (d) None of the above

10. If this model were to be changed and run again, which variable would you recommend to drop (or exclude) first?
    (a) X_1   (b) X_3   (c) X_5   (d) X_7

II. Calculation (50%)

1. **Probability density function**
   Let $(Y_1, Y_2)$ denote a random sample of size n=2 from the uniform distribution on the interval (0, 1). Please find the probability density function (p.d.f) for $U = Y_1 + Y_2$. (10%)

2. **ANOVA analysis**
   The accompanying data are yields on resistance to stain for three materials ($M_1, M_2$ and $M_3$) treated with four chemicals (A, B, C, D) in a randomized block design in Table 4.
Table 4  The accompanying data on resistance to stain

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Material</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M_1$</td>
<td>$M_2$</td>
</tr>
<tr>
<td>A</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>B</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>C</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>D</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>36</td>
</tr>
</tbody>
</table>

\[
\sum_{i,j} y_{ij}^2 = 674
\]

\[
(\sum_{i,j} y_{ij})^2 = 7056
\]

(1) Please construct an ANOVA table of the two factors, including Material factor and Chemical factor. (10%)

(2) Is there evidence of difference in mean resistance among the four chemicals? Please give the null and alternative hypotheses, statistics, and conclusion by using $\alpha=0.05$. (5%)

\[
F_{0.05}(6,3) = 8.94, \quad F_{0.05}(3,6) = 4.76, \quad F_{0.05}(2,3) = 9.55, \quad F_{0.05}(3,2) = 19.16
\]

3. Estimation and Chi-square testing

In order to test the assumption of a Poisson distribution for the number of arrivals during weekday morning hours, a store employee randomly selects a sample of 100 5-minute intervals during weekday mornings over a 3-week period. For each 5-minute intervals in the sample, the store employee records the number of customer arrivals.

(1) Suppose the sample is $X_1, X_2, \ldots, X_n$. Under the assumption of a Poisson distribution for the number of arrivals, please find the estimation for the mean of arrival rate $\lambda$ by the maximum likelihood estimate method (MLE). (5%)

(2) Is the estimation of the mean in the arrival rate for MLE unbiased? Please prove it. (5%)

Is the estimation of the mean in the arrival rate for MLE consistent? Please prove it. (5%)

(3) In summarizing the data, the employee determines the number of 5-minute interval having no arrivals, the number of 5-minute intervals having two arrivals, and so on. These data are summarized in the Table 5. Use $\alpha$-level=0.05, and test whether the number of customer arrivals follows a Poisson distribution. (10%)

\[
\chi^2_{0.05}(4) = 9.49, \quad \chi^2_{0.05}(5) = 11.07, \quad \chi^2_{0.05}(6) = 12.59, \quad \chi^2_{0.05}(7) = 14.06
\]
<table>
<thead>
<tr>
<th>Number of Customers Arriving</th>
<th>Observed Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>21</td>
</tr>
<tr>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td>4</td>
<td>18</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>
1. NUK Bank agrees to lend David NT$1,230,000 to buy a house. They agree to a nominal interest rate of 1.375%. Both expect the inflation rate to be 4%.

   (1) Calculate the expected real interest rate. (3 points)

   (2) If inflation rate turns out to be 2.5% over the life of the loan, what is the real interest rate? Who gains from unexpectedly low inflation? (3 points)

   (3) If inflation rate turns out to be 5.5% over the life of the loan, what is the real interest rate? Who gains from unexpectedly high inflation? (3 points)

2. In January 2009, the ROC had a labor force of 10,881,000, employment of 10,303,000, and there were 7,873,000 people not in the labor force.

   (1) Calculate the unemployment rate. (3 points)

   (2) Calculate the participation rate. (3 points)

   (3) Calculate the employment ratio. (3 points)

3. If Acer Corporation has current and future marginal productivity of capital given by \( MPC = 6,000 - 3K + N \), and marginal productivity of labor given by \( MPL = 80 - 1.5N + 2.5K \). The price of capital is NT$3,000, the real interest rate is 2%, and capital depreciates at a 10%. The real wage rate is NT$12.

   (1) Calculate the user cost of capital. (3 points)

   (2) Find the Acer’s optimal amount of employment and the size of the capital stock. (3 points)

4. Suppose the money demand function is \( M_d/P = 1,400 + 0.3Y - 5,000(r + e) \).

   (1) Calculate velocity if \( Y = 1,000 \), \( r=7\% \), and \( e=3\% \). (3 points)

   (2) If the money supply is 2,400, what is the price level? (3 points)

5. What are the problems with using the stock index growth rate to forecast recessions? (10 points)

6. If the Central Bank of ROC decided to adopt the inflation targeting. Please describe the strategy of inflation targeting. What are your opinions about the advantages and disadvantages of inflation targeting? (10 points)

7. Suppose that Mary’s utility function is \( U(X_1, X_2) = \max\{X_1, X_2\} \). \( X_1 \) and \( X_2 \) are the consumption of the good 1 and 2. \( P_1 \) and \( P_2 \) are the prices of the good 1 and 2. Please analyze Mary’s optimal choice. (10 points)

8. True or False. Please explain your answers. (15 points)

   (1) Price equals marginal cost is a sufficient condition for firms’ profit maximization in a competitive or monopoly industry.

   (2) Suppose that a firm’s production is determined by labors and capitals. In the long-run, the marginal product of labor is diminishing.

   (3) In the short-run, a firm’s producer surplus equals the firm’s profits.
9. Suppose that firm A and firm B are both considering expanding their plant capacity as strategic move but cannot observe their opponent’s move until their own move has been determined. The following is the profits matrix. (15 points)

<table>
<thead>
<tr>
<th></th>
<th>Airbus expand</th>
<th>Airbus doesn’t expand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boeing expand</td>
<td>(0.3, 0.2)</td>
<td>(1, 0.4)</td>
</tr>
<tr>
<td>Boeing don’t expand</td>
<td>(0.8, 1.8)</td>
<td>(1.1, 1.5)</td>
</tr>
</tbody>
</table>

(1) Find the Nash equilibria including pure and mixed strategies.
(2) Suppose that Boeing and Airbus make their decisions sequentially. Boeing is the leader and Airbus can observe Boeing’s decision. What is the subgame - perfect Nash equilibrium?

10. An economy has 20 people, 10 of them have utility function \( U(x, y) = x + y \) and 10 of them have utility function \( U(x, y) = \min\{2x, y\} \). Everybody has the endowment of 1 unit of x and 1 unit of y. Find the competitive equilibrium prices and consumptions for each type of person. (10 points)
I. Multiple Choice Questions (2 points each, total 60 points)

Note: Use the following format to write your answers of this section in your answer sheet. No points will earn without the following format in this section.

<p>| | | | | | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
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<tr>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
<td>29</td>
<td>30</td>
</tr>
</tbody>
</table>

1. Which of the following does NOT address the question: “What are the duties of a financial manager?”
   I. Deciding the mix of long-term debt and equity.
   II. Deciding the yield on the corporation’s bonds.
   III. Deciding which projects a firm should undertake.
   IV. Deciding the market price of a company’s stock.
   V. Deciding how much short-term debt to use.
   a. I only
   b. II and III only
   c. II and IV only
   d. II, III, and IV only
   e. I, II, III, and V only

2. Which of the following is NOT a type of agency cost?
   I. The cost of providing life insurance to the firm’s CEO.
   II. The cost of an audit of the firm’s financial statements.
   III. The cost of paying dividends to shareholders of the firm.
   IV. The cost of paying interest to creditors of the firm.
   a. I and II only
   b. II and III only
   c. III, and IV only
   d. I and IV only
   e. I, II, III, and IV

3. Which of the following is a true statement regarding the asset risk?
   I. Asset-specific risk is also known as systematic risk.
   II. The risk premium depends only on diversifiable risk.
   III. Diversification works because Unsystematic risk exists.
   IV. Beta is a coefficient to reflect asset-specific risk.
   a. I only
   b. II only
   c. III only
   d. I and II only
   e. III and IV only

4. Which of the following would NOT be considered a secondary market transaction?
   a. Kold Co. issues 1 million new shares through Morgan Stanley.
   b. Bob sells 1,000 shares of Disney through his broker.
   c. Sam sells 1,000 shares of Dush, Inc., which he bought in an IPO last month, through his broker.
   d. Sally purchases 100 shares of IBM through her broker.
   e. Sunny sells 1,000 shares of a company listed on NASDAQ.
5. According to the expectations theory, if next year's expected short-term rate is below the current short-term rate, the yield curve will be
   a. horizontal.
   b. vertical.
   c. upward sloping.
   d. downward sloping.
   e. a curve with increasing slopes.

6. The interest rate used to calculate the present value of future cash flows is called the
   a. risk-free interest rate.
   b. nominal interest rate.
   c. real interest rate.
   d. coupon rate.
   e. discount rate.

7. You are choosing between investments offered by two different banks. One promises a return of 5% for five years using simple interest while the other offers a return of 5% for five years using compound interest. You should:
   a. Choose the simple interest option because it provides a higher return.
   b. Choose the compound interest option because it provides a higher return.
   c. Choose the compound interest option only if the compounding is for monthly periods.
   d. Choose the simple interest option only if compounding occurs more than once a year.
   e. Choose the compound interest option only if you are investing less than $50,000.

8. Your parents agree to pay half of the purchase price of a new car when you graduate from college. You will graduate and buy the car two years from now. You have $6,000 to invest today and can earn 5% on invested funds. If your parents match the amount of money you have in two years, what is the maximum you can spend on the new car?
   a. $6,300
   b. $12,600
   c. $13,230
   d. $13,891
   e. $16,579

9. The internal rate of return (IRR) rule can be best stated as:
   a. An investment is acceptable if its IRR is exactly equal to zero.
   b. An investment is acceptable if its IRR is exactly equal to its net present value.
   c. An investment is acceptable if its IRR is exactly equal to the required return, else it should be rejected.
   d. An investment is acceptable if its IRR is less than the required return, else it should be rejected.
   e. An investment is acceptable if its IRR exceeds the required return, else it should be rejected.

10. You are considering an investment with the following cash flows. Your required return is 3%, you require a payback of 3 years and a discounted payback of 4 years. If your objective is to maximize your wealth, should you take this investment?

<table>
<thead>
<tr>
<th>Year</th>
<th>Cash Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-$40,000</td>
</tr>
<tr>
<td>1</td>
<td>$20,000</td>
</tr>
<tr>
<td>2</td>
<td>$20,000</td>
</tr>
<tr>
<td>3</td>
<td>$20,000</td>
</tr>
<tr>
<td>4</td>
<td>$20,000</td>
</tr>
<tr>
<td>5</td>
<td>-$40,000</td>
</tr>
</tbody>
</table>

   a. Yes, because the NPV is positive.
b. Yes, because the payback is less than 3 years.
c. Yes, because the discounted payback is less than 4 years.
d. No, because the NPV is negative.
e. No, because the project cash flows are not conventional.

11. An insurance company expects to receive a large payment in three months. When the payment is received, it will be invested in short-term securities. It can hedge against a change in interest rates if it:
a. buys Treasury bill futures contracts.
b. buys Treasury bond futures contracts.
c. sells Treasury bill futures contracts.
d. sells Treasury bond futures contracts.
e. sells stock index futures contracts.

12. An decrease in the financial leverage of a firm as a result of a decrease in outstanding debt will the potential reward to stockholders while the risk of financial bankruptcy.
a. decrease; decreasing
b. increase; increasing
c. decrease; increasing
d. increase; decreasing
e. not affect; decreasing

13. Paul purchased 2,000 shares of stock at a price of $5 per share. One year later, the shares sold for $6.2 each. At the end of the year, a $0.15 per share dividend was paid. What is the total percentage return for his investment?
a. 13.5 %
b. 15 %
c. 24 %
d. 27 %
e. 30 %

14. The 180-day interest rates (annualized) in the U.S. and Japan are, respectively, 10% and 7%, while the direct spot quote for the yen in New York is $.004300. At what 180-day forward rate would interest rate parity hold?
a. 0.004430
b. 0.004271
c. 0.004365
d. 0.004176
e. 0.004600

15. The value of a European option always
a. exceeds its intrinsic value.
b. exceeds its strike price.
c. rises with the time to maturity.
d. rises with the interest rate.
e. rises with the volatility of the exchange rate.

16. In a world with taxes and financial distress, when a firm is operating with the optimal capital structure:
I. the debt-equity ratio will also be optimal.
II. the weighted average cost of capital will be at its minimal point.
III. the required return on assets will be at its maximum point.

IV. the increased benefit from additional debt is equal to the increased bankruptcy costs of that debt.
   a. I and IV only
   b. II and IV only
   c. I and II only
   d. II, III, and IV only
   e. I, II, and IV only

17. Which of the following is not empirically true when formulating capital structure policy?
   a. Some firms use no debt.
   b. Most corporations have low debt-asset ratios.
   c. Debt ratios in most countries are considerably less than 100%.
   d. Debt levels across industries vary widely.
   e. There are no differences in the capital-structure of different industries.

18. All else equal, the market value of a stock will tend to decrease by roughly the amount of the dividend on the:
   a. dividend declaration date.
   b. ex-dividend date.
   c. date of record.
   d. date of payment.
   e. day after the date of payment.

19. The information content of a dividend increase generally signals that:
   a. the firm has a one-time surplus of cash.
   b. investor dislike of uncertainty.
   c. management believes that the future earnings of the firm will be strong.
   d. the firm has more cash than it needs due to sales declines.
   e. future dividends will be lower.

20. A reason for acquisitions is synergy. Synergy includes:
   a. revenue enhancements.
   b. cost reductions.
   c. lower taxes.
   d. All of the above.
   e. a and b only.

21. MM Proposition I with corporate taxes states that:
   a. capital structure can affect firm value.
   b. by raising the debt-to-equity ratio, the firm can lower its taxes and thereby increase its total value.
   c. firm value is maximized at an all debt capital structure.
   d. all of the above.
   e. a and b only.

22. Ceteris paribus, the duration of a bond is positively correlated with the bond’s
a. face value
b. coupon rate
c. yield to maturity
d. all of the above
e. none of the above

23. The duration of a 5-year zero coupon bond is
   a. smaller than 5
   b. equal to 5
   c. larger than 5
   d. equal to 0
   e. none of the above

24. The basic purpose of immunization is to
   a. eliminate default risk
   b. eliminate inflation risk
   c. produce a zero net interest rate risk
   d. a and c
   e. a and b

25. Which of the following theories state that the shape of the yield curve is essentially determined by the supply and demands for long- and short-maturity bond?
   a. Liquidity preference theory.
   b. Expectations theory.
   c. Market segmentation theory.
   d. MM theory.
   e. Pecking order theory.

26. In an efficient market,________________.
   a. security prices react quickly to new information.
   b. one cannot make money.
   c. security analysts will not enable investors to realize superior returns consistently.
   d. a and c.
   e. a and b.

27. A finding that__________ would provide evidence against the semi-strong form of the efficient market theory.
   a. trend analysis is worthless in determining stock prices.
   b. Low P/E stocks tend to have positive abnormal returns.
   c. Futures changes in stock prices cannot be predicted from past prices.
   d. a and b.
   e. b and c.

28. Other things being equal, diversification is most effective when__________.
   a. securities’ returns are high.
b. securities’ returns are low.
c. securities’ returns are uncorrelated.
d. securities’ returns are positively correlated.
e. securities’ returns are negatively correlated.

29. Consider an investment opportunity set formed with two securities that are perfectly negatively correlated. The global minimum variance portfolio has a standard deviation that is always ________________.
   a. equal to zero.
b. equal to -1.
c. greater than zero.
d. equal to the sum of the securities’ standard deviations.
e. between zero and one.

30. Suppose two portfolios have the same average return, the same standard deviation of returns, but portfolio A has a higher beta than portfolio B. According to the Sharpe measure, the performance of portfolio A ________________.
   a. is the same as the performance of portfolio B.
b. is better than the performance of portfolio B.
c. is poorer than the performance of portfolio B.
d. cannot be measured as there is no data on the alpha of the portfolio.
e. none of the above.

II. Problem Solving and Essay Questions (total 40 points)
1. Suppose you have predicted the following returns for securities A and B in three possible market conditions.

<table>
<thead>
<tr>
<th>State</th>
<th>Probability</th>
<th>Return on security A</th>
<th>Return on security B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boom</td>
<td>0.4</td>
<td>16%</td>
<td>-20%</td>
</tr>
<tr>
<td>Normal</td>
<td>0.5</td>
<td>8%</td>
<td>4%</td>
</tr>
<tr>
<td>Bust</td>
<td>0.1</td>
<td>2%</td>
<td>9%</td>
</tr>
</tbody>
</table>

(1) What are the expected returns? (2 points)
(2) Which security has the greatest total risk? Why? (2 points)
(3) Suppose you have invested 40% of your money in security A, and 60% in security B. What is the expected return and total risk for the portfolio? (4 points)

2.
(1) Suppose you use the market-to-book ratio of equities to identify whether the stocks are undervalued or not. And you have earned abnormal return by buying the undervalued stocks. What form of market efficiency has been violated? Why? (2 points)

(2) You have discovered from looking at charts of past stock prices that if you buy just after a stock price has declined for four consecutive days, you make money every time! What form of market efficiency has been violated in this stock market? Why? (2 points)
3. The table below reports the ROE and ROA for two different financial institutions. Using the data below can you determine what proportion of each institution's total assets are financed by equity capital (4 points) and what proportion are financed by debt? (4 points)

<table>
<thead>
<tr>
<th>Financial Institution</th>
<th>ROE</th>
<th>ROA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC</td>
<td>15%</td>
<td>2.16%</td>
</tr>
<tr>
<td>XYZ</td>
<td>8%</td>
<td>1.5%</td>
</tr>
</tbody>
</table>

4. Calculate the modified duration of a seven-year par value bond with annual coupon rate of 9%, and a maturity value of 1000. (10 points)

5. Suppose the risk-free return is 6%. The beta of a managed portfolio is 1.5, the alpha is 6%, and the average return is 18%. Based on Jensen’s measure of portfolio performance, you would calculate the return on the market portfolio as __________. (5 points)

6. Consider two perfectly negatively correlated risky securities A and B. A has an expected rate of return of 10% and a standard deviation of 16%. B has an expected rate of return of 8% and a standard deviation of 12%. The weights of A and B in the global minimum variance are __________ and ______________. (5 points)