1. **[31.5 pts]** A portion of a data set containing information for 14 mutual funds that are part of the Morningstar Funds 500 for 2008 follows.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Fund Name** | **Fund Type** | **Net Asset Value ($)** | **5 Year Average Return (%)** | **Expense Ratio (%)** | **Morningstar Rank** |
| Amer Cent Inc & Growth Inv | DE | 28.88 | 12.39 | 0.67 | 2-Star |
| American Century Intl. Disc | IE | 14.37 | 30.53 | 1.41 | 3-Star |
| American Century Tax-Free Bond | FI | 10.73 | 3.34 | 0.49 | 4-Star |
| American Century Ultra | DE | 24.94 | 10.88 | 0.99 | 3-Star |
| Ariel | DE | 46.39 | 11.32 | 1.03 | 2-Star |
| Artisan Intl Val | IE | 25.52 | 24.95 | 1.23 | 3-Star |
| Artisan Small Cap | DE | 16.92 | 15.67 | 1.18 | 3-Star |
| Baron Asset | DE | 50.67 | 16.77 | 1.31 | 5-Star |
| Brandywine | DE | 36.58 | 18.14 | 1.08 | 4-Star |
| Brown Cap Small  | DE | 35.73 | 15.85 | 1.20 | 4-Star |
| Buffalo Mid Cap | DE | 15.29 | 17.25 | 1.02 | 3-Star |
| Delafield | DE | 24.32 | 17.77 | 1.32 | 4-Star |
| DFA U.S. Micro Cap | DE | 13.47 | 17.23 | 0.53 | 3-Star |
| Dodge & Cox Income | FI | 12.51 | 4.31 | 0.44 | 4-Star |

The data setaboveincludes the following five variables:

**Type**: The type of fund, labeled DE (Domestic Equity), IE (International Equity), and FI (Fixed Income).

**Net Asset Value ($)**: The closing price per share on December 31, 2007.

**5-YearAverageReturn(%)**: Theaverageannualreturnforthefundoverthepast5years.

**ExpenseRatio(%)**: The percentage of assets deducted each fiscal year for fund expenses.

**Morningstar Rank**: The risk adjusted star rating for each fund; Morningstar ranks go from a low of 1-Star to a high of 5-Stars.

a. Develop an estimated regression equation that can be used to predict the 5-year average return given fund type. (If you use Excel, you have to upload the file. Otherwise, no points will be given) **[3 pts]**

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b. Use *α* = 0.05 to test if the independent variable in the estimated regression equation from (a) is significant. Provide your reason. **[4 pts]**

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c. What is the 99% confidence interval of β1 for the estimated regression equation from (a)? **[3.5 pts]**

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d. Develop a 95% confidence interval to predict the mean 5-year average return given fund type FI. **[10 pts] Hint: Use the regression equation from part a.**

(1) Write down the formula calculating the confidence interval estimate of the mean 5-year average return given fund type FI:

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(2) Start your calculation here:

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e. Develop an estimated regression equation that can be used to predict the 5-year average return given the type of fund, the expense ratio, and the Morningstar Rank. You don’t need to remove any insignificant variables. What is the estimated regression equation? (If you use Excel, you have to upload the file. Otherwise, no points will be given) **[5 pts]**

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f. (1) What is the value of adjusted multiple coefficient of determination for the estimated regression equation in (e)? **[1.5 pts]** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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(2) Explain the meaning of adjusted multiple coefficient of determination: **[1.5 pts]**

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g. Use *α* = 0.05 to test if the independent variables in the estimated regression equation from (e) are significant. Provide your reason. **[3 pts]**

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2. **[13 pts]** In a completely randomized design, 12 experimental units were used for the first treatment, 15 for the second treatment, and 20 for the third treatment.

a. Complete the following ANOVA table. **[7 pts]**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Source of Variation | Sum of Squares | Degrees of Freedom | Mean Square | *F* |
| Treatments | 1200 | (2) | (5) | (7) |
| Error | (1) | (3) | (6) | --- |
| Total | 1800 | (4) | --- | --- |

1. Write down the formula or concept calculating cell (1) and complete the calculation:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Write down the formula or concept calculating cell (2) and complete the calculation:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Write down the formula or concept calculating cell (3) and complete the calculation:

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1. Write down the formula or concept calculating cell (4) and complete the calculation:

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1. Write down the formula or concept calculating cell (5) and complete the calculation:

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1. Write down the formula or concept calculating cell (6) and complete the calculation:

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1. Write down the formula or concept calculating cell (7) and complete the calculation:

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b. At *α* = 0.05 level of significance, is there a significant difference between the treatments? Why? **[6 pts]**

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