

EM 600 Engineering Economics and Cost Analysis, **Homework #4**  
*School of Systems & Enterprises, Stevens Institute of Technology*

**“I PLEDGE MY HONOR THAT I HAVE ABIDED BY THE STEVENS HONOR SYSTEM”**

By: \_\_\_\_\_

**QUESTION 1:**

- a. Assume that the expected inflation rate is 5%. If the market interest rate is 10%, what should the interest-free inflation rate be? **[3 points]**
- b. The Shakalaka investment company plans to make a series of five constant dollar (or real-dollar) payments are made over a five-year period to offset its one bad debt in an account. The payments begin with a \$35,000 payment at the end of the first year. The payments then increase at the rate of 7% per year. The average general inflation rate is 9%, and the market interest rate is 12% during this five-year period.

Calculate the inflation free interest rate. **[3 points]**

What is the equivalent present worth of the series? **[4 points]**

**QUESTION 2:**

- a. Given the following cash flow data:

Period, n	Net Cash Flow in Constant Dollars
0	-\$125,000
1	\$90,000
2	\$60,000
3	\$70,000
4	\$80,000
5	\$80,000

With a 12% inflation-free rate of return ( $i'$ ) calculate the present worth of the cash flow series in constant dollars. **[5 points]**

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b. Given the following cash flow data:

Period, n	Net Cash Flow in Actual Dollars
0	-\$75,000
1	\$35,000
2	\$37,000
3	\$38,250
4	\$42,500
5	\$45,000

With a general inflation rate ( $f$ ) of 4% per year and a 5% inflation-free rate of return ( $i'$ ) calculate the present worth of the cash flow series **using the adjusted discount method. [5 points]**

**QUESTION 3:**

Chavez Villas is considering an expansion to their Acapulco resort. The financial data is as follows:

- Investment: \$3,000,000
  - 45% debt equity ratio. Loan (\$1,350,000) borrowed at 6% interest.
- Project life: 6 years
- Salvage value: \$300,000
  - **Year 6 dollars**
- Depreciation method: 5-year MACRS
- Income tax rate: 30%
- Annual Revenue: \$1,500,000
  - **Year 1 dollars**
- Annual Expense: \$450,000
  - **Year 1 dollars**
  - Does NOT include depreciation
  - Does NOT include interest
- Market interest rate ( $i$ ): 12%

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If the general inflation rate (effects revenues, expenses, salvage value) during the next 6 years is expected to increase by 4% annually:

- a. Develop the income statement for the project. **[12 points]**
- b. Develop the cash flow statement for the project. **[3 points]**  
(Hint: Don't forget the Financing Activities)
- c. Determine the PW of the project. Is the project economically viable and why? **[4 + 1 points]**  
(Hint: Cash flows in Actual dollars, given market interest rate. Therefore, no need to convert to constant dollars before calculating PW)

**QUESTION 4:**

Two alternatives are being considered by a food processor for the warehousing and distribution of its canned products in a sales region. These canned products come in standard cartons of 24 cans per carton. A summary of the financial information of these 2 alternatives are listed as follows:

Alternative 1: Build its Own Distribution System data:

- Investment cost \$70,000 (installed)
- Estimated useful life of 5 years
- Salvage value of \$52,000 at EOY 1, decreasing at a rate of 4% each year.
- Operating and maintenance costs are expected to be \$12,000 at EOY 1 increasing at a rate of 15% each year.

Alternative 2: Buy a Distribution System from a Distribution Company:

- Estimated useful life of 5 years
- Salvage value of \$38,000 after the first year (from today), decreasing at a rate of 5% each year.
- Current market value of \$55,000
- Operating and maintenance costs for the next 5 years are expected to be \$11,000 in the first year increasing at a rate of 15% each year.

With a MARR of 12%, calculate the following:

- a. Calculate the economic service life for each alternative. **[4 + 4 points]**
- b. What are your conclusions? **[2 points]**