

Name: _____

- d. (10 points) Plot your average cost per mile of owning and operating the car as a function of monthly mileage, assuming that
- monthly usage is between 500 and 1,000 miles
 - the life of the car is 10 years, and that
 - your MARR is 8%.

Problem 2 (20 points)

A new building is expected to cost \$5,000,000 and will last for 50 years, assuming that \$500,000 is spent on a major rehabilitation at the end of year 20. Routine maintenance and management expenses are expected to cost \$10,000 per year. The building is expected to be leased to a major firm for the life of the building. What is the uniform monthly payment that would be equivalent to these costs over the 50-year life of the building, assuming a discount rate of 8%? (Ignore taxes, inflation, depreciation and any other complicating factors that you may worry about.)

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Problem 3 (10 points)

Assume interest is compounded daily (i.e. continuously).

Estimate the following:

- a. The future value of \$1,000 invested for 22 years at 5%, then reinvested for 7 years at 10%: _____

- b. The present worth of \$600,000 due in 7 years, assuming that your MARR is 10%:

- c. Which is worth more today:
\$10,000 that you would receive in 22 years _____ or
\$6,500 that you would receive in 14 years _____, assuming your MARR is 5%

Problem 4 (20 points)

What is wrong with the following statements:

- a. Boston can sell municipal bonds with an interest rate of 4%, so the City can use a discount rate of 4% in evaluating projects.

- b. A company can borrow money at 6%, but the stock market requires a 12% return; the company therefore should use a discount rate of at least 12% in evaluating projects.

- c. A construction company has built numerous office buildings throughout the U.S. and has consistently been able to achieve a return-on-investment of 10%. In evaluating opportunities to invest in Colombia, Bosnia, and Rwanda, the company can therefore safely use a 10% discount rate.

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- d. An investor is happy with a 6% return on investments in corporate bonds; this investor would therefore be willing to invest in your scheme to build hotels, because you also expect a return of 6%.

- e. An investor expects at least a 15% return when investing in telecommunications stocks. This investor would therefore not be interested in buying municipal bonds that pay 4% or corporate bonds that pay 6%.

5. Discuss one of the following (20 points):

a. Clearly, there are economies of scale in construction and operation of transit vehicles. The larger the bus, the lower the cost/seat for both construction and operation. What determines the size of new buses that you might use for a new express commuter bus service?

b. In the early 19th century, canals took traffic off the roads in the eastern US. In the mid-19th century, railroads took traffic away from the canals throughout the same region. In the early 20th century, the Panama Canal took traffic away from the Panama Railway; in the later part of the 20th century, roads took traffic back from the railways in the US. What is going on?