Guidelines of Take-home Quiz

(Due to 10/23/2006)

- Must deliver by person in class!!!
- Demonstrate full solution with proper equations and CF diagrams-No partial point.
- Print and return your quiz papers as a hard copies. First page must be signed guidelines of Quiz.
- Twelve questions, one point at each that 10% of your total grade.
- Neatness counts
- In taking this exam, I (the examinee) understand that I may not work with anyone else, including conferring with others (student, or anyone else); exchanging information, answer or ideas; or in aiding or being aided by others in the completion of this assignment. I understand that failure to follow this rules is considered cheating, and may subject me to a significant reduction in my grade at the discretion of the professor. I certify that I have personally prepared the answers to this assignment in accordance with the above stated rules

- Signature of the examinee:............................................................
Problem 1

Problems 5.58 through 5.60 are based on the following estimates. The cost of money is 10% per year.

<table>
<thead>
<tr>
<th></th>
<th>Machine X</th>
<th>Machine Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial cost, $</td>
<td>-66,000</td>
<td>-46,000</td>
</tr>
<tr>
<td>Annual cost, $/year</td>
<td>-10,000</td>
<td>-15,000</td>
</tr>
<tr>
<td>Salvage value, $</td>
<td>10,000</td>
<td>24,000</td>
</tr>
<tr>
<td>Life, years</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

- The present worth of machine X is closest to
  \[ PW_X = -66,000 - 10,000(P/A,10\%,6) + 10,000(P/F,10\%,6) \]
  \[ = -66,000 - 10,000(4.3553) + 10,000(0.5645) \]
  \[ = \$-103,908 \]

- In comparing the machines on a present worth basis, the present worth of machine Y is closest to
  \[ PW_Y = -46,000 - 15,000(P/A,10\%,6) - 22,000(P/F,10\%,3) + 24,000(P/F,10\%,6) \]
  \[ = -46,000 - 15,000(4.3553) - 22,000(0.7513) + 24,000(0.5645) \]
  \[ = \$-114,310 \]

  LCM=6 yr.

- The capitalized cost of machine X is closest to
  \[ CC_X = [-66,000(A/P,10\%,6) - 10,000 + 10,000(A/F,10\%,6)]/0.10 \]
  \[ = [-66,000(0.22961) - 10,000 + 10,000(0.12961)]/0.10 \]
  \[ = \$-238,582 \]

Problem 2

The cost of maintaining a public monument in Washington, D.C., occurs as periodic outlays of $10,000 every 5 years. If the first outlay is now, the capitalized cost of the maintenance at an interest rate of 10% per year is closest to

\[ CC = -10,000(A/P,10\%,5)/0.10 \]
\[ = -10,000(0.26380)/0.10 \]
\[ = \$-26,380 \]

Problem 3.

A corporate bond has a face value of $10,000, a bond interest rate of 6% per year payable semiannually, and a maturity date of 20 years from now. If a person purchases the bond for $9000 when the interest rate in the marketplace is 8% per year, compounded semiannually, the size and frequency of the interest payments the person will receive are closest to

\$S300 every 6 months\
**Problem 4.**
A municipal bond that was issued 3 years ago has a face value of $5000 and a bond interest rate of 4% per year payable semiannually. The bond has a maturity date of 20 years from the date it was issued. If the interest rate in the marketplace is 8% per year, compounded quarterly, the value of n that must be used in the P/A equation to calculate the present worth of the bond?

\[ n = 34 \]

**Problem 5.**
Accusoft Systems is offering business owners a software package that keeps track of many accounting functions from the company’s bank transactions sales invoices. The site license will cost $22,000 to install and will involve a quarterly fee of $2000. If a certain small company can save $3500 every quarter and have the security of managing its books in-house, how long will it take for the company to recover its investment at an interest rate of 4% per quarter?

\[ 0 = -22,000 + (3500 - 2000)(P/A,4\%,n) \]
\[ (P/A,4\%,n) = 14.6667 \]

\[ n \text{ is between 22 and 23 quarters or 5.75 years} \]

**Problem 6.**
A medium-size municipality plans to develop a software system to assist in project selection during the next 10 years. A life-cycle cost approach has been used to categorize costs into development, programming, operating, and support costs for each alternative. There are three alternatives under consideration, identified as A (tailored system), B (adapted system), and C (current system). The costs are summarized below. Use a life-cycle cost approach to identify the best alternative at 8% per year.

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Component</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Development</td>
<td>$250,000 now, $150,000 years 1 through 4</td>
</tr>
<tr>
<td></td>
<td>Programming</td>
<td>$45,000 now, $35,000 years 1, 2</td>
</tr>
<tr>
<td></td>
<td>Operation</td>
<td>$50,000 years 1 through 10</td>
</tr>
<tr>
<td></td>
<td>Support</td>
<td>$30,000 years 1 through 5</td>
</tr>
<tr>
<td>B</td>
<td>Development</td>
<td>$10,000 now</td>
</tr>
<tr>
<td></td>
<td>Programming</td>
<td>$45,000 year 0, $30,000 years 1 through 3</td>
</tr>
<tr>
<td></td>
<td>Operation</td>
<td>$80,000 years 1 through 10</td>
</tr>
<tr>
<td></td>
<td>Support</td>
<td>$40,000 years 1 through 10</td>
</tr>
<tr>
<td>C</td>
<td>Operation</td>
<td>$175,000 years 1 through 10</td>
</tr>
</tbody>
</table>
LCC_A = -250,000 – 150,000(P/A,8%,4) – 45,000 – 35,000(P/A,8%,2) -50,000(P/A,8%,10) – 30,000(P/A,8%,5) = -250,000 – 150,000(3.3121) – 45,000 – 35,000(1.7833) -50,000(6.7101) – 30,000(3.9927) = $-1,309,517

LCC_B = -10,000 – 45,000 - 30,000(P/A,8%,3) – 80,000(P/A,8%,10) - 40,000(P/A,8%,10) = -10,000 – 45,000 - 30,000(2.5771) – 80,000(6.7101) - 40,000(6.7101) = $-937,525

LCC_C = -175,000(P/A,8%,10) = -175,000(6.7101) = $-1,174,268

Select alternative B.

Problem 7.

Two methods are under consideration for producing the case for a portable hazardous material photoionization monitor. A plastic case will require an initial investment of $75,000 and will have an annual operating cost of $27,000 with no salvage after 2 years. An aluminum case will require an investment of $125,000 and will have annual costs of $12,000. Some of the equipment can be sold for $30,000 after its 3-year life. At an interest rate of 10% per year, which case should be used on the basis of a present worth analysis?

PW_{plastic} = -75,000 - 27,000(P/A,10%,6) - 75,000(P/F,10%,2)- 75,000(P/F,10%,4) = -75,000 - 27,000(4.3553) - 75,000(0.8264) - 75,000(0.6830) = $-305,798

PW_{aluminum} = -125,000 – 12,000(P/A,10%,6) – 95,000(P/F,10%,3)+ 30,000(P/F,10%,6) = -125,000 – 12,000(4.3553) – 95,000(0.7513) + 30,000(0.5645) = $-231,702

Use aluminum case

Problem 8.

An interest rate of 1.5% per month, compounded continuously, is closest to an effective of:

i/quarter = e^{0.045} – 1 = 0.0460 = 4.60% per quarter

Problem 9.

Exotic Faucets and Sinks, Ltd., guarantees that its new infrared sensor faucet will save any household that has two or more children at least $30 per month in water costs beginning 1 month after the faucet is installed. If the faucet is under full warranty for 5 years, the minimum amount a family could afford to spend now on such a faucet at an interest rate of 6% per year, compounded monthly, is closest to

P = 30(P/A,0.5%,60) = $1552
Problem 10.
The cost for increasing the production capacity in a certain manufacturing facility is expected to increase by 7% per year over the next 5-year period. If the cost at the end of year 1 is $39,000 and the interest rate is 10% per year, the present worth of the costs through the end of the 5-year period is represented by the equation of:

\[ P = 39,000 \left\{ 1 - \left[ \frac{(1+0.07)^5}{(1+0.10)^5} \right] \right\} / (0.10 - 0.07) \]

Problem 11.
A public relations company hired by the city of El Paso to increase tourism to the Sun City proposed that the city build the world’s only roller coaster that travels through two different countries. The idea is to build the ride along the Rio Grande River and have part of the tracks in the United States and part in Mexico. The ride would be built such that coaster cars could be launched from either side of the border, but riders would get off at the same point where they got on. After the ride becomes operational, tourism revenue is projected to be $1 million initially (i.e., at time 0), $1.05 million after the first month, $1.1025 million after the second month, and amounts increasing by 5% each month through the first year. At an interest rate of 12% per year, compounded monthly, the present worth (time 0) of the tourism revenue generated by the ride is closest to

\[ P = 1,000,000 + 1,050,000 \left\{ 1 - \left[ \frac{(1 + 0.05)^{12}}{(1 + 0.01)^{12}} \right] \right\} / (0.01 - 0.05) \]
\[ = 16,585,447 \]

Problem 12.
Border Steel invested $800,000 in a new shearing unit. At an interest rate of 12% per year, compounded quarterly, the quarterly income required to recover the investment in 3 years is closest to

\[ A = 800,000 \left( A/P, 3\%, 12 \right) \]
\[ = 800,000(0.10046) \]
\[ = 80,368 \]