First year using the MACRS method:

The annual depreciation is 10% for each of the first five years. After that, the depreciation is 20% and 5% for the last two years. The salvage value is $5,000. After 10 years, the equipment has a market value of $25,000.

$25,000 is the initial cost of the equipment. The system cost is $8,000. A 4% annual interest rate is used. What is the present worth of the annual interest to be paid, if the equipment is purchased today?

A machine costs $10,000 and can be depreciated over a period of four years, after which it is sold for $500. Write the depreciation equation for the machine.

If a machine costs $10,000 and can be depreciated over a period of four years, after which it is sold for $500, write the depreciation equation for the machine.

The machine will cost $2000. What is the straight-line depreciation in the first year of the machine's life?

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The machine will cost $2000. What is the straight-line depreciation in the first year of the machine's life?
9. A machine initially costing $25,000 will have a salvage value of $6000 after five years. Using MACRS depreciation, what will its book value be after the third year?

\[
\text{Book Value} = 25000 \left(1 - 2 - 32 - 192\right) 
\]

(A) $5470
(B) $7200
(C) $10,000
(D) $13,600

10. Given the following cash flow diagram and an 8% effective annual interest rate, what is the equivalent annual expense over the five-year period?

\[
F = 2500 \left(1 + 0.08\right)^5 
\]

(A) $427,000
(B) $540,000
(C) $678,000
(D) $691,000

11. The construction of a volleyball court for the employees of a highly successful mid-sized publishing company in California is expected to cost $1200 and have annual maintenance costs of $300. At an effective annual interest rate of 5%, what is the project's capitalized cost?

\[
= 1200 + \frac{300}{0.05} = 7200 
\]

(A) $113,000
(B) $125,000
(C) $225,000
(D) $250,000

12. A warehouse building was purchased 10 years ago for $250,000. Since then, the effective annual interest rate has been 8%, inflation has been steady at 2.5%, and the building has had no deterioration or decrease in utility. What should the warehouse sell for today?

\[
d = \frac{1}{1 + 0.08} + \frac{1}{(1 + 0.08)^2} + \ldots + \frac{1}{(1 + 0.08)^{10}} 
\]

(A) $427,000
(B) $540,000
(C) $678,000
(D) $691,000

13. A delivery company is expanding its fleet by five vans at a total cost of $75,000. Operating and maintenance costs for the new vehicles are projected to be $20,000/year for the next eight years. After eight years, the vans will be sold for a total of $10,000. Annual revenues are expected to increase by $40,000 with the expanded fleet. What is the company's rate of return on the purchase?

\[
\text{Rate of Return} = \frac{\text{Net Present Value}}{\text{Initial Cost}} 
\]

(A) 19.7%
(B) 20.8%
(C) 21.7%
(D) 23.2%

14. A company is considering replacing its air conditioner. Management has narrowed the choices to two alternatives that offer comparable performance and considerable savings over their present system. The effective annual interest rate is 8%. What is the benefit-cost ratio of the better alternative?

<table>
<thead>
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<th>II</th>
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<tbody>
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</tr>
<tr>
<td>annual savings</td>
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<tr>
<td>salvage value</td>
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<td>$-1250</td>
</tr>
<tr>
<td>life</td>
<td>15 years</td>
<td>15 years</td>
</tr>
</tbody>
</table>

(A) 1.73
(B) 1.76
(C) 1.84
(D) 1.88
15. A gourmet ice-cream store has fixed expenses (rent, utilities, etc.) of $30,000/year. Its two full-time employees each earn $25,000 per year. There is also a part-time employee who makes $14,000 plus $6000 in overtime if sales reach $120,000 in a year. The ice cream costs $4/L to produce and sells for $7/L. What is the minimum number of liters the store must sell to break even?

\[ F = A \left( \frac{(1 + i)^n - 1}{i} \right) \]
\[ = (200) \left( \frac{(1 + 0.0067)^{120} - 1}{0.0067} \right) \]
\[ = $459,227 \]

Answer is D.

Solution 3:
The effective rate per quarter is
\[ i = \frac{r}{m} = \frac{0.06}{4} = 0.015 \]
There are four compounding periods during the year.
\[ n = 4 \]
Use the sinking fund factor.
\[ A = F(A/F, i, n) \]
\[ = (5000)(A/F, 1.5\%, 4) \]
\[ = (5000) \left( \frac{0.015}{(1 + 0.015)^4 - 1} \right) \]
\[ = $1222 \]

monthly savings = \frac{1222}{quarter}
= $407/month

Answer is C.

Solution 4:
This cash flow is equivalent to a $20,000 annual series with a -$1000/year gradient. Use the tables of factors.
\[ P = (20,000)(P/A, 6\%, 10) - (1000)(P/G, 6\%, 10) \]
\[ = (20,000)(7.3601) - (1000)(29.6023) \]
\[ = $117,600 \]

Answer is A.

Solution 5:
The effective annual interest rate is
\[ i_e = \left( 1 + \frac{r}{m} \right)^m - 1 \]
\[ = \left( 1 + \frac{0.05}{12} \right)^{12} - 1 \]
\[ = 0.05116 \]
The total future value is
\[ F = P(F/P, i\%, n) = P(1 + i)^n \]
\[ = ($5000)(1 + 0.05116)^5 \]
\[ = $6417 \]

The interest available is
\[ \text{interest} = F - P = $6417 - $5000 \]
\[ = $1417 \quad ($1420) \]

(This problem can also be solved by calculating the effective interest rate per period and compounding for 60 months.)

Answer is D.

Solution 6:
The uniform series compound amount factor does not include a contribution at \( t = 0 \). Therefore, calculate the future value as the sum of a single payment and an annual series.
\[ F = P(F/P, r\%, n) + A(F/A, r\%, n) \]
\[ = P(e^{rn}) + A \left( \frac{e^{rn} - 1}{e^r - 1} \right) \]
\[ = ($10,000)(e^{(0.05)(21)}) + ($1000) \left( \frac{e^{(0.05)(21)} - 1}{e^{(0.05)} - 1} \right) \]
\[ = $64,808 \]

Answer is C.

Solution 7:
With the straight-line method, depreciation is the same in each year.
\[ D_3 = D = \frac{C - S_n}{n} \]
\[ = \frac{$10,000 - $2000}{4 \text{ years}} \]
\[ = $2000/\text{year} \]

Answer is A.

Solution 8:
MACRS depreciation depends only on the original cost, not on the salvage cost or hours of operation.
\[ D_j = (C)(\text{factor}) \]
\[ D_1 = ($2,500,000)(0.10) \]
\[ = $250,000 \]

Answer is D.

Solution 9:
Book value is the initial cost less the accumulated depreciation. Use the MACRS factors for a five-year recovery period.
\[ BV = C - \sum_{j=1}^{t} D_j \]
\[ = C - \sum_{j=1}^{t} ((C)(\text{factor}_j)) \]
\[ = C \left( 1 - \sum_{j=1}^{3} \text{factor}_j \right) \]
\[ = ($25,000)(1 - (0.20 + 0.32 + 0.192)) \]
\[ = $7200 \]

Answer is B.

Solution 10:
First, find the present worth of all of the cash flows.
\[ P = $500 + ($50)(P/A, 8\%, 5) + ($50)(P/G, 8\%, 4) + ($100)(P/F, 8\%, 5) \]
\[ = $500 + ($50)(3.9927) + ($50)(4.6501) + ($100)(0.6806) \]
\[ = $1000 \]

Next, find the effective uniform annual expense (cost).
\[ \text{EUAC} = ($1000)(A/P, 8\%, 5) \]
\[ = ($1000)(0.2505) \]
\[ = $251 \]

Answer is C.

Solution 11:
Find the capitalized cost of the annual maintenance and add the initial construction cost to it.
\[ P = C + \frac{A}{i} \]
\[ = $1200 + \frac{$300}{0.05} \]
\[ = $7200 \]

Answer is C.
Solution 12:
Ideally, the current price should be the future worth (from 10 years ago), adjusted for inflation. Use the inflation-adjusted interest rate, \( d \), together with the single payment compound amount factor.

\[
d = i + f + if = f + \frac{f}{1+f} \\
= 0.08 + 0.025 + (0.08)(0.025) \\
= 0.107 \\
F = P(F/P, d\%, n) = (\$250,000)(1 + 0.107)^{10} \\
= \$690,902 \\
\text{(\$691,000)}
\]

Answer is D.

Solution 13:
Rate of return is the effective annual interest rate that would make the investment's present worth zero.

\[
P = 0 = -(\$75,000) \\
+ (\$40,000 - \$20,000)(P/A, i\%, 8) \\
+ (\$10,000)(P/F, i\%, 8) \\
\$75,000 = (\$20,000)\left(\frac{(1+i)^8 - 1}{i(1+i)^8}\right) \\
+ (\$10,000)(1 + i)^{-8}
\]

By trial and error, \( i = 0.217 \) (21.7%).

Answer is C.

Solution 14:
Compute the present worth of the benefits and costs for each alternative. Salvage value should be counted as a decrease in cost, not as a benefit.

For alternative I,

\[
B = (\$1500)(P/A, 8\%, 15) \\
= (\$1500)(8.5595) \\
= \$12,839 \\
C = \$7000 - (\$500)(P/F, 8\%, 15) \\
= \$7000 - (\$500)(0.3152) \\
= \$6842 \\
\frac{B}{C} = \frac{12,839}{6842} = 1.88
\]

For alternative II,

\[
B = (\$1900)(P/A, 8\%, 15) \\
= (\$1900)(8.5595) \\
= \$16,263 \\
C = \$9000 + (\$1250)(P/F, 8\%, 15) \\
= \$9000 + (\$1250)(0.3152) \\
= \$9394 \\
\frac{B}{C} = \frac{16,263}{9394} = 1.73
\]

The alternatives cannot be compared to one another based simply on their ratios. Instead, perform an incremental analysis.

\[
\frac{B_2 - B_1}{C_2 - C_1} = \frac{16,263 - 12,839}{9394 - 6842} = 1.34
\]

Because the incremental analysis ratio is greater than one, alternative II is superior.

Answer is A.

Solution 15:
Calculate the costs and revenues assuming sales of $120,000 are exceeded.

\[
\text{costs} = \$50,000 + (2)(\$25,000) + \$14,000 \\
+ \$6000 + \left(\frac{$4}{L}\right)Q \\
\text{revenues} = \left(\frac{$7}{L}\right)Q
\]

At the break-even point, costs equal revenues.

\[
\left(\frac{$7}{L}\right)Q = \$120,000 + \left(\frac{$4}{L}\right)Q \\
Q = 40,000 \text{L}
\]

Check the assumption that sales exceed $120,000.

\[
\left(\frac{$7}{L}\right)(40,000 \text{L}) = \$280,000 \text{ [ok]}
\]

Answer is C.