CHAPTER 16 SOLUTIONS

Exercise 16-25 (20 minutes)

1. To determine the amount you need to accumulate by the time you retire, calculate the present value of a 40-year annuity in the amount of $225,000. (Use Table IV in the Appendix.)

\[
\text{Present value} = \text{(annuity discount factor for } n = 40, r = .12)(\$225,000) = (8.244)(\$225,000) = \$1,854,900
\]

Thus, you need to accumulate $1,854,900 in your account by the time you retire.

2. To determine the amount you need to deposit each year for 15 years, calculate the annuity amount that will accumulate to a future value of $1,854,900 in 15 years. (Use Table II in the Appendix.)

\[
\text{Future value} = \text{(annuity accumulation factor for } n = 15, r = .12)(\text{annuity amount})
\]

\[
\$1,854,900 = (37.280)(\text{annuity amount})
\]

Annuity amount = \(\frac{\$1,854,900}{37.280} = \$49,755.90\)

Thus, you need to deposit $49,755.90 into your account each year from age 25 through age 39.

3. This is both a present-value and a future-value problem. The problem has two parts. Requirement (1) is a present-value problem; requirement (2) is a future-value problem.

Exercise 16-26 (15 minutes)

<table>
<thead>
<tr>
<th>Cost of new well (time 0)</th>
<th>($2,825)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present value of annual savings: (($500 \times 6.710^*))</td>
<td>(3,355)</td>
</tr>
<tr>
<td>Net present value</td>
<td>($530)</td>
</tr>
</tbody>
</table>

*From Table IV in the Appendix: \(r = .08\) and \(n = 10\).

The governing board should approve the new well, because the project’s net present value is positive.
Exercise 16-27 (15 minutes)

Annuity discount factor associated with the internal rate of return = \[
\frac{\text{initial cash outflow}}{\text{annual cost savings}} = \frac{2,825}{500} = 5.650
\]

Find 5.650 in the 10-year row of Table IV in the Appendix. This annuity discount factor falls in the 12 percent column. Thus, the project's internal rate of return is 12 percent. The governing board should approve the new well, because the project's internal rate of return is greater than the hurdle rate of 8 percent.

Problem 16-38 (30 minutes)

1. The team is better off financially if the trade does not occur.

Keep Moran:

Salary, 20x1: $600,000 x .893*………………………. $ 535,800
Salary, 20x2: $650,000 x .797*………………………. 518,050
Salary, 20x3: $750,000 x .712*………………………. 534,000
Free-agent inflow: $800,000 x .712*…………………. 569,600
Net present value……………………………………….. $(1,018,250)

Acquire Mendoza:

Salary (annual)………………………………………….. $(1,000,000)
Net cash inflows from attendance (annual)………….. 570,000
Total annual cash flow……………………………. $ (430,000)
Annuity discount factor (Table IV, r = .12, n = 3)…. x 2.402
Present value of annual cash flows…………………. $(1,032,860)
Signing bonus (time 0)………………………………… (1,230,000)
Free-agent inflow: $1,500,000 x .712*……………….. 1,068,000
Net present value……………………………………….. $(1,194,860)

* Table III, r = .12

Note: With regard to Mendoza's signing bonus, the important point is when the cash flow occurs (time 0). How the Bullets treat the bonus for financial-reporting purposes (i.e., expensing the figure over a three-year period) is not relevant for purposes of computing discounted cash flows.
2. Mendoza would prefer the $1,230,000 bonus that he received. Although the cash flows are the same under both options (e.g., $410,000 x 3 years = $1,230,000), Mendoza has more cash up front, allowing him to invest a greater sum and receive added returns than if the money were spread over a three-year period. Mendoza’s up-front bonus has a higher present value associated with it, because dollars received in early years have a greater time value than dollars received in the future.

3. The hurdle rate is the discount rate or the team’s minimum desired rate of return. It is influenced by the investment opportunity rate—the rate that the team can earn on alternative investments of equivalent risk.

4. Events might include: player injury and/or suspension; other player trades; team morale; overall team performance; ability to make play-offs; changes in contracts for concessions, parking, and broadcasting rights; a significant change in the free-agent market; and so forth.

PROBLEM 16-38 (CONTINUED)

Generally speaking, an individual would have less faith in ten-year data than three-year data. The future is subject to change and as one goes further into the future, there is a greater degree of uncertainty.

Problem 16-45 (50 minutes)

1. See the following table.
2. See the following table.
3. See the following table.
4. The administrator should recommend that the clinic be built, because its net present value is positive.
**Problem 16-45 (continued)**

<table>
<thead>
<tr>
<th>Type of Cash Flow</th>
<th>20x0</th>
<th>20x1</th>
<th>20x2</th>
<th>20x3</th>
<th>20x4</th>
<th>20x5</th>
<th>20x6</th>
<th>20x7</th>
<th>20x8</th>
<th>20x9</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Construction of clinic</td>
<td>$(390,000)</td>
<td>$(390,000)</td>
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<tr>
<td>(2) Equipment purchase</td>
<td></td>
<td></td>
<td>$(800,000)</td>
<td>$(800,000)</td>
<td>$(800,000)</td>
<td>$(800,000)</td>
<td>$(800,000)</td>
<td>$(800,000)</td>
<td>$(800,000)</td>
<td>$(800,000)</td>
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<td>(3) Staffing</td>
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<td>(4) Other operating costs</td>
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<td>(5) Increased charitable contributions</td>
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<td>(6) Cost savings at hospital</td>
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<td>(7) Cost of refurbishment</td>
<td></td>
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<tr>
<td>(9) Salvage value</td>
<td></td>
<td></td>
<td>250,000</td>
<td>250,000</td>
<td>250,000</td>
<td>250,000</td>
<td>250,000</td>
<td>250,000</td>
<td>250,000</td>
<td>250,000</td>
</tr>
</tbody>
</table>

Incremental cash flow                   | $(390,000) | $(540,000) | $250,000 | $250,000 | $70,000 | $250,000 | $250,000 | $250,000 | $250,000 | $540,000 |

Discount factor*                         | $1.000 | $0.893 | $0.797 | $0.712 | $0.636 | $0.567 | $0.507 | $0.452 | $0.404 | $0.361 |

Present value                            | $(390,000) | $(482,220) | $199,250 | $178,000 | $159,000 | $39,690 | $126,750 | $113,000 | $101,000 | $194,940 |

Net present value                        |         |         |         |         |         |         |         |         |         |         |

Sum: $239,410

*Table III: \( r = .12 \).