5.1 (a) Jim forgot the impact of interest, that is, the time value of money, which will increase the annual recovery amount.

(b) Use Equation [5.3] to find the capital recovery amount with S = 0.

\[
CR = AW = -20,000\left(\frac{A}{P},15\%,5\right) \\
= -20,000(0.29832) \\
= \$-5,966 \text{ per year}
\]

5.9 Calculate AW values to select machine R.

\[
AW_R = -250,000\left(\frac{A}{P},9\%,3\right) + 20,000\left(\frac{A}{F},9\%,3\right) - 40,000 \\
= -250,000(0.39505) + 20,000(0.30505) - 40,000 \\
= \$-132,662
\]

\[
AW_S = -370,500\left(\frac{A}{P},9\%,5\right) + 20,000\left(\frac{A}{F},9\%,5\right) - 50,000 \\
= -370,500(0.25709) + 20,000(0.16709) - 50,000 \\
= \$-141,910
\]

By spreadsheet, enter single cell functions.

R: \[= -\text{PMT}(9\%,3,-250000,20000) - 40000 \text{ Display: } \$-132,663\]

S: \[= -\text{PMT}(9\%,5,-370500,20000) - 50000 \text{ Display: } \$-141,911\]

5.14 From Example 4.2, bond P = \$4750; I = \$150 each 6 months; n = 20; i = 3.35% per 6 months.

\[
AW = -4750\left(\frac{A}{P},3.35\%,20\right) + 150 + 5000\left(\frac{A}{F},3.35\%,20\right) \\
= -4750(0.06941) + 150 + 5000(0.03591) \\
= \$-15
\]

The return is approximately that desired based on AW value.

5.17 Find F in year 12; treat it as a CC value; find A forever.

\[
F_{12} = 4\left(\frac{F}{P},12\%,11\right) - 1\left(\frac{F}{P},12\%,9\right) - 3\left(\frac{F}{P},12\%,8\right) - 3\left(\frac{F}{P},12\%,7\right) \\
+ 1\left(\frac{F}{P},12\%,6\right) + 4\left(\frac{F}{P},12\%,5\right) + 6\left(\frac{F}{P},12\%,4\right) + 8\left(\frac{F}{P},12\%,3\right) \\
+ 10\left(\frac{F}{P},12\%,2\right) + 12\left(\frac{F}{A},12\%,2\right) + 38 \\
= 4(3.4785) - 1(2.7731) - 3(2.4760) - 3(2.2107) \\
+ 1(1.9738) + 4(1.7623) + 6(1.5735) + 8(1.4049) \\
+ 10(1.2544) + 12(2.1200) + 38 \\
= \$102,768
\]

\[
A = \text{CC}(i) = F_{12}(i) = 102,768(0.08) \\
= \$ 8.22 \text{ per year} \quad (\$8,221,440 \text{ per year})
\]
A spreadsheet solution follows.

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5.22 Monetary terms are $ million. Effective $i = (1.025)^4 – 1 = 10.38\%$. Select A.

\[
AW_A = -10(A/P,10.38\%,5) + 0.7(A/F,10.38\%,5) – 0.8
\]

\[
= -10(0.26636) + 0.7(0.16256) – 0.8
\]

\[
= $-3.35 \quad ($3.35\ million)
\]

\[
AW_B = -50(0.1038) – 0.6
\]

\[
= $-5.79 \quad ($5.79\ million)
\]