Chapter 12 Homework Solutions

12.2 (a) Depreciation = Rate(495,000)

| Year | Depr | BV |
|---|---|---|
| 1 | $164,984 | $330,016 |
| 2 | 220,028 | 109,988 |
| 3 | 73,309 | 36,679 |
| 4 | 36,678 | 0 |

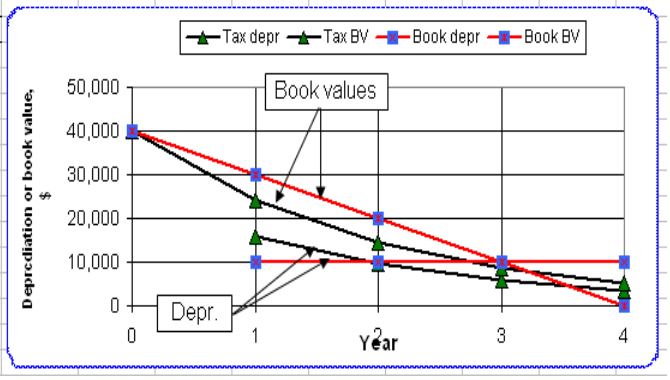
(b) $BV_3$ = $36,679 while market value is much higher at $150,000. The rates reduce the asset to zero salvage, not recognizing the $150,000 salvage.

12.3 (a, b) Tax depreciation: $D_t = Rate(BV_{t-1})$
Book depreciation: $D_t = Rate(40,000)$

| | Tax | | Book | |
|---|---|---|---|---|
| Year | Depr | BV | Depr | BV |
| 0 | | 40,000 | | 40,000 |
| 1 | 16,000 | 24,000 | 10,000 | 30,000 |
| 2 | 9,600 | 14,400 | 10,000 | 20,000 |
| 3 | 5,760 | 8,640 | 10,000 | 10,000 |
| 4 | 3,456 | 5,184 | 10,000 | 0 |

A spreadsheet solution with graphs follows.

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 1 | | Tax depreciation | | | Book depreciation | | |
| 2 | Year | Rate | Depr | BV | Rate | Depr | BV |
| 3 | 0 | | | 40,000 | | | 40,000 |
| 4 | 1 | 0.4 | 16,000 | 24,000 | 0.25 | 10,000 | 30,000 |
| 5 | 2 | 0.4 | 9,600 | 14,400 | 0.25 | 10,000 | 20,000 |
| 6 | 3 | 0.4 | 5,760 | 8,640 | 0.25 | 10,000 | 10,000 |
| 7 | 4 | 0.4 | 3,456 | 5,184 | 0.25 | 10,000 | 0 |




12.4 Productive life – Time the asset is actually expected to be in service.
Tax recovery period – Time allow by tax laws to depreciate the asset's value to salvage (or zero).
Book recovery period – Time used on company accounting books for depreciation to salvage (or zero)

**Straight Line (SL) Depreciation**

12.5 (a) d = 1/10 = 0.1 or 10%

(b) S = 0.15(475,000) = $71,250

$D_t = (550{,}000 - 71{,}250)/10 = \$47{,}875$ per year

(c) $BV_5 = 550{,}000 - 5(47{,}875) = \$310{,}625$

(d) $BV_{10} = 550{,}000 - 10(47{,}875)$
$= \$71{,}250 = S$

12.14 (a) DDB: $d = 2/12 = 0.1667$
$BV_{12} = B(1-d)^{12} = 180{,}000(1-0.1667)^{12}$
$= \$20{,}188$

150% DB: $d = 1.5(1/12) = 0.125$
$BV_{12} = 180{,}000(1-0.125)^{12}$
$= \$36{,}255$

(b) S = $30,000 is between the two implied salvages.

(c) DDB: writes off *more* since all $150,000 is depreciated.
150% DB: writes off *less* since it will stops at $BV_{12} = \$36{,}255$

12.17 The n = 5 years from Table 12-4, rates are from Table 12-2; salvage is not used.

$D_t = \text{rate}(1{,}200{,}000)$ and $BV_t = BV - BV_{t-1} - D_t$

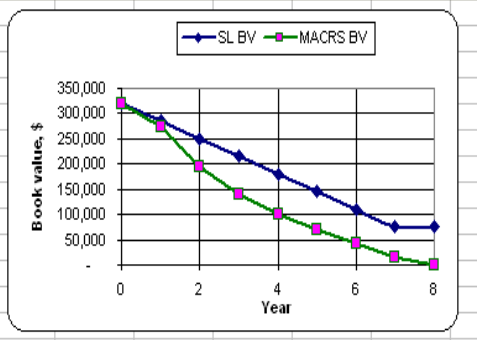
| | A | B | C | D |
|---|---|---|---|---|
| 1 | Year | Rate | Depreciation | Book value |
| 2 | 0 | 0 | | 1,200,000 |
| 3 | 1 | 0.3333 | 399,960 | 800,040 |
| 4 | 2 | 0.4445 | 533,400 | 266,640 |
| 5 | 3 | 0.1481 | 177,720 | 88,920 |
| 6 | 4 | 0.0741 | 88,920 | 0 |
| 7 | Total | 1.0000 | 1,200,000 | |

12.19 (a) SL: $D_t = (320{,}000-75{,}000)/7 = \$35{,}000$ per year
MACRS: $D_t = \text{Rate}(320{,}000)$

| | Straight line | | MACRS | | |
|---|---|---|---|---|---|
| Year | Depr | BV | Rate | Depr | BV |
| 0 | | 320,000 | | | 320,000 |
| 1 | 35,000 | 285,000 | 0.1429 | 45,728 | 274,272 |
| 2 | 35,000 | 250,000 | 0.2449 | 78,368 | 195,904 |
| 3 | 35,000 | 215,000 | 0.1749 | 55,968 | 139,936 |
| 4 | 35,000 | 180,000 | 0.1249 | 39,968 | 99,968 |
| 5 | 35,000 | 145,000 | 0.0893 | 28,576 | 71,392 |
| 6 | 35,000 | 110,000 | 0.0892 | 28,544 | 42,848 |
| 7 | 35,000 | 75,000 | 0.0893 | 28,576 | 14,272 |
| 8 | 0 | 75,000 | 0.0446 | 14,272 | 0 |

Spreadsheet solution with BV plots follow.

| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 | | Straight line | | MACRS | | |
| 2 | Year | Depr | SL BV | Rate | Depr | MACRS BV |
| 3 | 0 | | 320,000 | | | 320,000 |
| 4 | 1 | 35,000 | 285,000 | 0.1429 | 45,728 | 274,272 |
| 5 | 2 | 35,000 | 250,000 | 0.2449 | 78,368 | 195,904 |
| 6 | 3 | 35,000 | 215,000 | 0.1749 | 55,968 | 139,936 |
| 7 | 4 | 35,000 | 180,000 | 0.1249 | 39,968 | 99,968 |
| 8 | 5 | 35,000 | 145,000 | 0.0893 | 28,576 | 71,392 |
| 9 | 6 | 35,000 | 110,000 | 0.0892 | 28,544 | 42,848 |
| 10 | 7 | 35,000 | 75,000 | 0.0893 | 28,576 | 14,272 |
| 11 | 8 | 0 | 75,000 | 0.0446 | 14,272 | 0 |
| 12 | Total | 245,000 | | 1.0000 | 320,000 | |
| 13 | | | | | | |
| 14 | | | | | | |




(b) MACRS neglects the salvage value; it always depreciates to zero.

12.23 (a) MACRS: rate for year 3 is 0.1440; sum of rates for 3 years is 0.4240.

$D_3 = 0.1440(800,000) = \$115,200$

$BV_3 = 800,000 – 0.4240(800,000) = \$460,800$

(b) DDB: d = 2/15 = 0.13333

$D_3 = 0.13333(800,000)(1\text{-}0.13333)^2 = \$80,117$

$BV_3 = 800,000(1\text{-}0.1333)^3 = \$520,776$

(c) ADS SL: d = 1/15 = 0.06666 years 2 through 15; ½ that for years 1 and 16.

$D_3 = 0.06666(800000\text{-}150,000) = \$43,329$

$BV_3 = 800,000 – 2.5(43,329) = \$691,678$

Spreadsheet solution for all parts follows. The relations used to determine the values (row 50 are indicated first (row 3).

| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 | MACRS | | DDB | | SL | |
| 2 | Depr | BV | Depr | BV | Depr | BV |
| 3 | = 0.144*800000 | = 800000-800000*(0.1+0.18 +0.144) | = DDB(800000,150000,15,3,2) | = 800000*(1-2/15)^3 | = (800000-150000)/15 | = 800000 - 2.5*E$3 |
| 4 | | | | | | |
| 5 | 115200 | 460800 | 80118 | 520770 | 43333 | 691666 |
| 6 | | | | | | |

12.36 Percentage depletion = 0.20(GI) = 500,000

GI = \$2,500,000

GI = (price)number of barrels

2,500,000 = 55(number of barrels)

Barrels = 45,455

Reserves = 45,455/0.01

= 4,545,500 barrels

12.37 Determine the cost depletion factor in $/1000 tons and multiply by yearly tonnage.

$$p_t = 2{,}900{,}000/100 = \$29{,}000 \text{ per } 1000 \text{ tons}$$

Annual cost depletion = volume × 29,000

| Year | Volume, 1000 tons | Cost depletion, $ per year |
|---|---|---|
| 1 | 10 | 290,000 |
| 2 | 12 | 348,000 |
| 3 | 15 | 435,000 |
| 4 | 15 | 435,000 |
| 5 | 18 | 522,000 |
| Total | 70 | $2,030,000 |