**Homework Set 4**

**EGR 310**

1. (Chapter 11) A company has purchased a backhoe for $120,000. The backhoe has a 6 year life and salvage value of $30,000. Compute the depreciation schedule using straight line depreciation. **(15 pts)**:

Soln:

|  |  |  |
| --- | --- | --- |
| YRS | 6 |  |
| Purchase | 120,000 |  |
| Salvage | 30000 |  |
|  | **YR** | **SL** |
|  | **1** | $15,000 |
|  | **2** | $15,000 |
|  | **3** | $15,000 |
|  | **4** | $15,000 |
|  | **5** | $15,000 |
|  | **6** | $15,000 |
|  | **Total** | $90,000 |

120,000-30,000 = 90,000/6 = 15,000

1. (Chapter 11) An asset was purchased for $100,000. It has a 5 year life. The asset is expected to have a salvage value of $10,000 after the five years. Show the depreciation and remaining book value for this asset for each of the 5 years using Double Declining Balance depreciation. **(15 pts)**

Soln:

|  |  |  |
| --- | --- | --- |
| **YR** | **Dep** | **BV** |
| **0** |  |  **$100,000**  |
| **1** |  **$40,000**  |  **$60,000**  |
| **2** |  **$24,000**  |  **$36,000**  |
| **3** |  **$14,400** |  **$21,600**  |
| **4** |  **$8,640**  |  **$12,960**  |
| **5** |  **$2,960** |  **$10,000** |

|  |  |  |
| --- | --- | --- |
| **YR** | **Dep** | **BV** |
| **0** |  |  **$100,000**  |
| **1** |  **$40,000**  |  **$60,000**  |
| **2** |  **$24,000**  |  **$36,000**  |
| **3** |  **$14,400** |  **$21,600**  |
| **4** |  **$8,640**  |  **$12,960**  |
| **5** |  **$2,960** |  **$10,000** |

Double declining balance:

1. (Chapter 11) Use MACRS to compute the depreciation schedule for office furniture purchased for $80,000 (use the 7 yr depreciation schedule). Assume salvage value is $10,000. **(10 pts)**

Soln:

|  |  |  |
| --- | --- | --- |
| **Purchase** | **$80,000** |  |
| **YR** | **7 yr MACRS** | **Dep** |
| 1 | 14.29% | $11,432 |
| 2 | 24.49% | $19,592 |
| 3 | 17.49% | $13,992 |
| 4 | 12.49% | $9,992 |
| 5 | 8.93% | $7,144 |
| 6 | 8.92% | $7,136 |
| 7 | 8.93% | $7,144 |
| 8 | 4.46% | $3,568 |
|  |  | $80,000 |

|  |  |  |
| --- | --- | --- |
| **Purchase** | **$80,000** |  |
| **YR** | **7 yr MACRS** | **Dep** |
| 1 | 14.29% | $11,432 |
| 2 | 24.49% | $19,592 |
| 3 | 17.49% | $13,992 |
| 4 | 12.49% | $9,992 |
| 5 | 8.93% | $7,144 |
| 6 | 8.92% | $7,136 |
| 7 | 8.93% | $7,144 |
| 8 | 4.46% | $3,568 |
|  |  | $80,000 |

1. (Chapter 11) What is the book value at the end of year 3 of an asset purchased for $50,000, depreciated over 5 years and a salvage value of $10,000 using: **(20 pts)**
	1. Straight Line Depreciation
	2. MACRS (use 5 year depreciation schedule)

Soln:

SL = (50000 – 10000)/5 = $8000/yr

MACRS Table 11-3

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| YRS | 5 |  |  |  |  |
| Purchase | $50000 |  |  |  |  |
| Salvage | $10000 |  |  |  |  |
|  |  |  |  |  |  |
| **YR** | **SL** | **SL BV** | **MACRS** | **M Dep**  | **MACRS BV** |
| **1** | $8,000 | $42,000 | 20.00% | $10,000 | $40,000 |
| **2** | $8,000 | $34,000 | 32.00% | $16,000 | $24,000 |
| **3** | $8,000 | $26,000 | 19.20% | $9,600 | $14,400 |
| **4** | $8,000 | $18,000 | 11.52% | $5,760 | $8,640 |
| **5** | $8,000 | $10,000 | 11.52% | $5,760 | $2,880 |

1. (Chapter 12) A company paid $200,000 for a machine to make a new product. The machine has a 5 year life and a salvage value of $20,000. The company makes $49,500 per year on the new product. Assuming a 31% tax rate and straight-line depreciation, what is the before tax and after tax rates of return on the investment over its 5 year life? (Do not interpolate. Round to the closest rate in appendix C of the book). **(20 pts)**

Soln:

Depreciation = (200,000 – 20,000)/5 = 36,000

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **YR** | **Investmt** | **Profit** | **Salvage** | **BTCF****(Inv + profit + salvage)** | **Dep** | **Tax Inc (Profit - Dep)** | **Tax****((.31)\* tax inc)** | **ATCF****(BTCF - tax)** |
| 0 | $-200,000 |  |  | $-200,000 |  |  |  | $-200,000 |
| 1 |  | $49,500 |  | $49,500 | $36,000 | $13,500 | $4,185 | $45,315 |
| 2 |  | $49,500 |  | $49,500 | $36,000 | $13,500 | $4,185 | $45,315 |
| 3 |  | $49,500 |  | $49,500 | $36,000 | $13,500 | $4,185 | $45,315 |
| 4 |  | $49,500 |  | $49,500 | $36,000 | $13,500 | $4,185 | $45,315 |
| 5 |  | $49,500 | $20,000 | $69,500 | $36,000 | $13,500 | $4,185 | $65,315 |

 BTCF IRR -> 200000 = 49,500(P/A, i, 5) + 20000(P/F, i, 5)

 @ 10% 49,500(3.791) + 20,000(.6209) = 200,072

 ATCF IRR -> 200000 = 45,315(P/A, i, 5) + 20000(P/F, i, 5)

 @ 7% 45,315(4.100) + 20000(.7130) = 200,051

1. (Chapter 13) A $20,000 machine will be purchased by a company with an MARR of 10%. It will cost $5,000 to install and removal costs are insignificant. What is its economic life and minimum EUAC cost given the following O&M costs:**(20 pts)**

|  |  |
| --- | --- |
| **YR, n** | **O&M** |
| **1** | **$5,000** |
| **2** | **$8,000** |
| **3** | **$11,000** |
| **4** | **$14,000** |
| **5** | **$17,000** |

Soln:

Need to compute Equivalent Uniform Annual Cost for purchase (20000\*(A/P, 10%, n) and Equivalent Uniform Annual Cost for O&M for each year (5000 + 3000(P/G, 10%, n)). Add together to get the total EUAC and find the minimum.

For each year, n, Total EUAC = 25000(A/P, 10%, n) + (5000 + 3000(A/G, 10%, n))

|  |  |  |  |
| --- | --- | --- | --- |
|  | **EUAC Cost** | **EUAC O&M** |  |
| **n** | 25000 \* (A/P, 10%, n) | **5000 + 3000 \*(A/G,10%, n)** | **Total EUAC** |
| 1 | $27,500 | $5000 | $32500 |
| 2 | $14,405 | $6428 | $20833 |
| 3 | $10052 | $7811 | $17863 |
| 4 | $7887 | $9143 | $17030 |
| 5 | $6595 | $10430 | $17025 |
| 6 | $5740 | $11672 | $17412 |
| 7 | $5135 | $12866 | $18001 |
| 8 | $4685 | $14012 | $18697 |
| 9 | $4340 | $15116 | $19456 |

Economic life is 5 years