Measures of profitability

Extending profitability coverage

Depreciation and Taxes

must be taken into account

Corporate taxes and depreciation

- To this point, we have considered cash flows without tax. This is called Cash Flow Before Tax (CFBT). However, companies have to pay income taxes.
- Governments and non-profit organizations do not have to pay income tax.
- Tax rates generally depend on income level, but we will consider cases with high enough income that the tax rate will be considered constant.
- We will take an overall tax rate of 25% unless otherwise stated. Confirm that this is reasonable on the CRA website.

Profitability

Corporate taxes and depreciation

Drive that new car off the car agent's lot …

- Depreciation means a decrease in worth. This could be due to wear and tear, technology changes (obsolescence), depletion, inflation, or failures.
- Companies must replace capital. *The government allows companies to lower their taxes through depreciation allowances – this helps to provide resources for (re)investment*.
- Is this "fair"?
- Can you depreciate your personal car ?

Corporate taxes and depreciation

Capital goods that can be depreciated are defined by the government. Typical properties of goods that can be depreciated are the following:

1. It must be used for the production of income.
2. It must have a determinable life longer than 1 year.
3. It must lose value over time.

Exercise: Which of the following can be depreciated by Suncor?

Laptop computers; printer paper; distillation columns; pumps; employee salaries; office buildings; land for the office buildings; company travel; CEO jet/vehicle; company travel; internet connection fees.

Corporate taxes and depreciation

- The government defines what and how goods can be depreciated (Canada Revenue Agency, CRA). We will cover the basic concepts in this course, not the detailed tax laws of Canada or another country.
- The company can reduce its taxable income by a loss in value of its equipment, i.e., by the depreciation. This reduces the taxes, not the company's actual income.

Tax paid = (tax rate) x (income – eligible expenses – depreciation)

Corporate taxes and depreciation

The following are "capital investments" and depreciated according to rules to be presented. **These are non-eligible expenses.** All the non-eligible expenses are summed up into a **"book value"** amount.

- The equipment cost itself
- Improvements in equipment and processes
- Design engineering
- Equipment shipping and installation
- Land improvements*, site preparation (roads, sewers etc.)

We say something is "expensed", when the **full cost is deducted** from income in the year of the cash flow. "Eligible expenses" are deducted in this way: salaries, utilities, raw materials, consumables, insurance (basically anything that is not *capital related*)

* The value of land is never depreciated, but it is expensed.

Profitability

Corporate taxes and depreciation

Canada Revenue Agency, CRA term for **depreciation** is

Capital Cost Allowance (CCA)

Class 8 (20%)
Class 8 with a CCA **rate of 20%** includes certain property that is not included in another class. Examples include furniture, appliances, tools costing $500 or more per tool, some fixtures, machinery, outdoor advertising signs, refrigeration equipment, and other equipment you use in business.

Class 52 (100%)
Include in Class 52 with a CCA rate of 100% (with no half year rule) general-purpose electronic data processing equipment … …. if they were acquired after January 27, 2009, and before February 2011, but not including …

Class 10 (30%)
Include in Class 10 with a **CCA rate of 30%** general-purpose electronic data-processing equipment (commonly called computer hardware) and systems software for that equipment, including ancillary data-processing equipment, if you acquired them before March 23, 2004, or after March 22, 2004, and before 2005, and you made an election.

Also include in Class 10 motor vehicles as well as some passenger vehicles as defined in Type of vehicle

etc, etc

Check class 43: that usually applies.

Profitability

Corporate taxes and depreciation

Depreciation in a time period is calculated as a ***percentage of the initial investment*** or remaining book value in that time period.

- Starts when equipment is "put in service". The length of time that the depreciation will take place is defined by the government in some cases.
- The remaining value at the end of each period is termed the "book value".
- The initial book value is the purchase (installed) price.

includes engineering, transportation, installation, and site preparation costs. We'll see more in "Cost Estimation".

Corporate taxes and depreciation

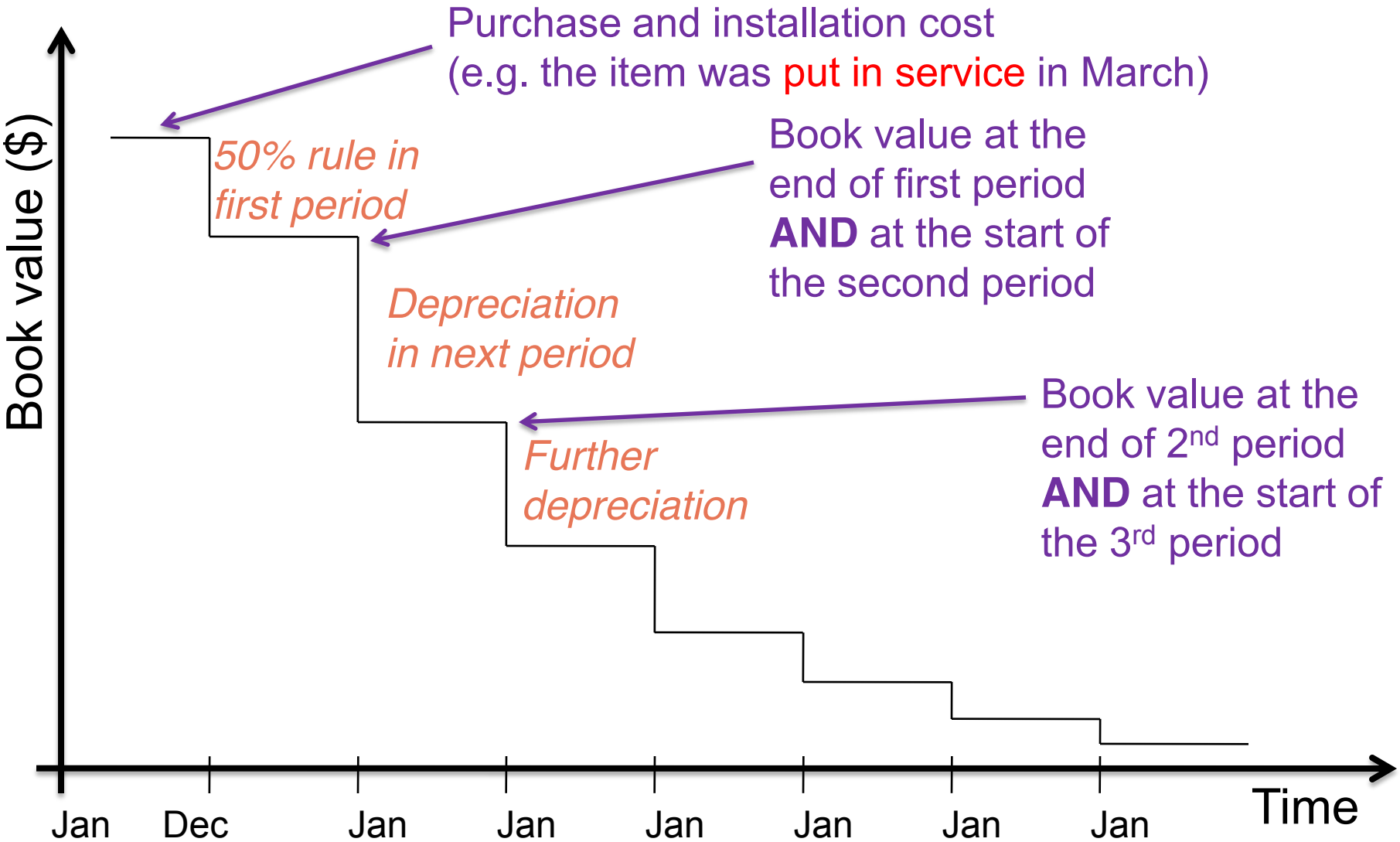
Let's look at ONE major depreciation method only.

But first, we recall that the typical time period is one year. When in the year does the company invest, January 1 or December 31?

50% Rule : The government sets the rules. It assumes that the investment is made in the middle of the year, and it allows only 50% of the depreciation for the first year.

We must abide by this rule!

Corporate taxes and depreciation



Profitability

Corporate taxes and depreciation

Declining balance depreciation

In this method, a percentage of the book value in each year is depreciated, so that the depreciated amount each year is not constant.

$$D_n = d \times B_n$$

$$B_n = B_{n-1} - D_{n-1}$$

$$D_0^{\text{actual}} = 0.5 D_0$$

B_0 = initial cost (installed price) of equipment

B_n = book value at time t

d = depreciation rate (government class)

D_n = **amount** depreciated each year

50% rule applies in first period

Corporate taxes and depreciation

Example

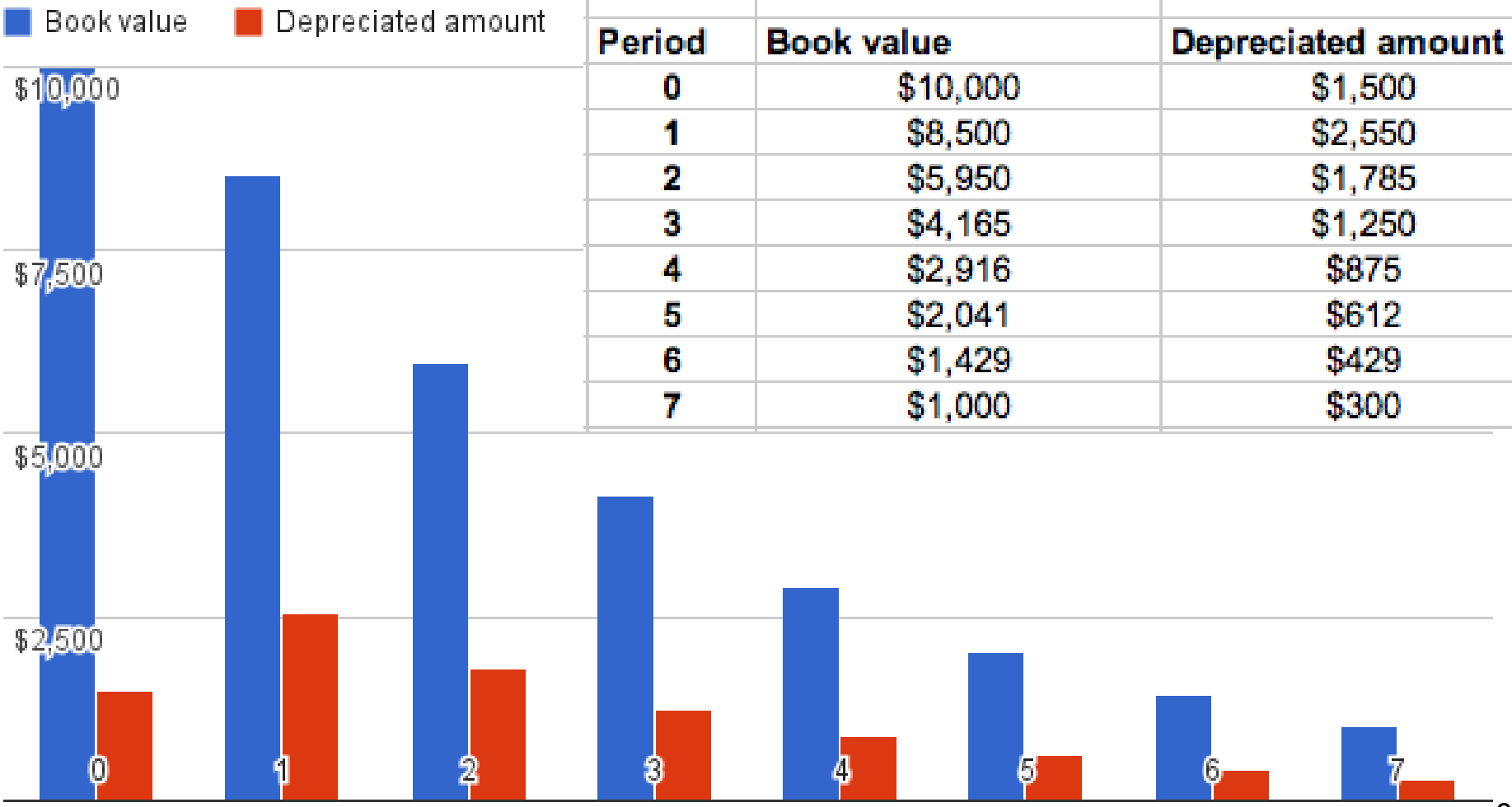
Suncor is purchasing a new reboiler for $10,000,000. The **CRA class is 43, with a rate of 30%**. Calculate and plot the book value (B_n) and depreciated amount (D_n) for 8 years.

Work in rounded $1000's.

Profitability

Corporate taxes and depreciation

	Depreciation rate =	0.3
Period	**Book value**	**Depreciated amount**
0	$10,000	$1,500
1	$8,500	$2,550
2	$5,950	$1,785
3	$4,165	$1,250
4	$2,916	$875
5	$2,041	$612
6	$1,429	$429
7	$1,000	$300



Profitability

Corporate taxes and depreciation

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What happens with these depreciated amounts?
The total will eventually add up to the original book value.

Is it an income?
Is it an expense?
Does it exist as cash in the company's bank account?

Note: those depreciated amounts are not deflated for TVM, so their true value is actually less in PV terms.

Profitability

Corporate taxes and depreciation

What's the main advantage of depreciation for the company?

The company pays lower taxes! They can *reduce* their taxable income in a year by the amount of depreciation during the year. The company can, in **each** period:

A = sum all income and revenues

B = sum all ***eligible*** expenses (use –ve's for expenses)

C = all non-eligible expenses (use –ve's; equipment, shipping, installation, *etc*)

D = calculate the book value (at start of the period; update it from previous)

E = calculate the depreciation, and **sum all depreciations up** [always +ve]

F = taxable income = **A** + **B** *minus* **E** (note that **B** must have negative sign)

G = **tax paid** = (taxable income) * (tax rate) [can be a +ve or –ve result]

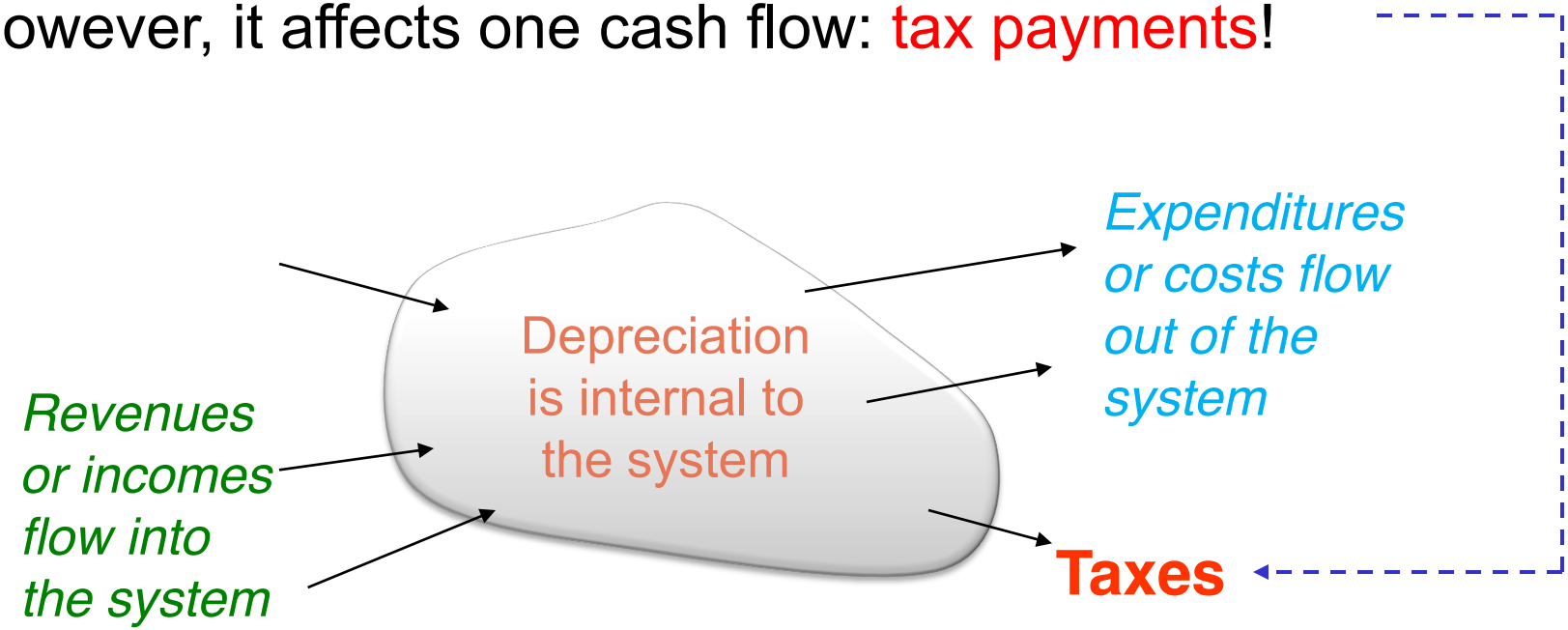
H = net cash flow for period = **A** + **B** + **C** *minus* **G**; then adjust **H** for TVM

Corporate taxes and depreciation

Point of frequent misunderstanding:

Depreciation is not a cash flow!

However, it affects one cash flow: tax payments!



Profitability

Corporate taxes and depreciation

Evaluate the **profitability** for installing an automated, online pulp quality analyzer (Kappa number) on a Kraft digester.

Analyzer capital cost including installation = $75,000
Analyzer maintenance cost = $5,000/year (except for first year)
Increased profit due to improved pulp quality = $20,000/year

Depreciate the analyzer using the declining balance method. The analyzer has an expected life of 5 years. The salvage value is $0.

Assume it is January 2014. Your company's year end is 31 December. Assume the equipment can be installed and put in service in January 2014.

Calculate the **payback time**, **cash flows** in each period, **NPV** (using a TVM of 8%), and **DCFRR**. The company's MARR is 10%.

In class: set up the problem and calculate for *n=0*, *n=1*. Do the rest at home.

Profitability

Corporate taxes and depreciation

	Depreciation rate =	**0.3**				
	TVM rate =	**0.08**				
	Corporate tax rate	**0.25**				
Period	**Revenue [A]**	**Eligible Exp [B]**	**Non-eligible exp [C]**	**Book value [D]**	**Depreciation [E]**	**Taxable income [F]**
0	$20,000	$0	-$75,000	$75,000	$11,250	$8,750
1	$20,000	-$5,000	$0	$63,750	$19,125	-$4,125
2	$20,000	-$5,000	$0	$44,625	$13,388	$1,613
3	$20,000	-$5,000	$0	$31,238	$9,371	$5,629
4	$20,000	-$5,000	$0	$21,866	$6,560	$8,440

Period	**Tax paid [G]**	**Net cash flow [H]**	**Cumulative CF**	**TVM cash flow**	**Cuml TVM cash**
0	$2,188	-$57,188	-$57,188	-$57,188	-$57,188
1	-$1,031	$16,031	-$41,156	$14,844	-$42,344
2	$403	$14,597	-$26,559	$12,514	-$29,829
3	$1,407	$13,593	-$12,967	$10,790	-$19,039
4	$2,110	$12,890	-$77	$9,475	-$9,564
			SUM	-$9,564	
			DCFRR	0.00	
			i.e.	0%	

Payback time is in period *n*=5 (around 5.1 years, although the life of the equipment is 5 years, we may never reach payback). Cash flows are shown above; NPV's are as shown; DCFRR=0% *in the 5 year period*.

Profitability

Corporate taxes and depreciation

Straight line depreciation

The CRA allows straight line depreciation in very limited classes.

Example: $10,000 over a 4 year (CRA specifies this) duration, allows for depreciation amounts of:

- $2,500/2 in year 1 (BV = $8,750)
- $2,500 in year 2 (BV = $6,250)
- $2,500 in year 3 (BV = $3,750)
- $2,500 in year 4 (BV = $1,250)
- $1,250 in year 5 (BV = $0)

Profitability

Corporate taxes and depreciation

Group learning / Self-learning:

1. Determine the typical corporate tax rate in several countries.
2. What is the effect on cash flow after tax when a depreciated good is sold for a price different from its book value?
3. What is the (approximate) relationship between the MARR before and after taxes?
4. The company purchases and installs new equipment on January. How much can be depreciated during the first year?

   More generally, when can a company begin depreciating a capital expense?

Profitability

Corporate taxes and depreciation

Group learning / Self-learning:

5. What is more beneficial to a profitable company? Why?
   a. Rapid depreciation
   b. Slow depreciation
6. How can a government encourage investment in a specific technology via the tax laws? (for example, information technology, sustainability, or environmental protection)
7. What is the effect of a negative income taxes, which can occur when depreciation in greater in magnitude than net income?