Break-Even, Accounting and Ratios for ADM1300

- **Fixed Costs**: Costs *that do not* vary with level of production (office salaries, rent, insurance, depreciation)
- **Variable Costs**: Costs *that do* vary with the level of production (sales commission, overtime payments, direct labour, electricity)

2 Types of Break-Even Questions

1. Break-even **(in $ amounts)**

$$B.E.(\$) = \frac{FC\ (Fixed\ Costs)}{(1 - VC(Variable\ Costs)/SP(Selling\ Price))}$$

2. Break-even **(in unit amounts)**

$$B.E.(units) = \frac{FC\ (Fixed\ Costs)}{UC\ (Unit\ Contribution)}$$

- Unit Contribution is = *Selling price* per unit **(SP)** – *Variable cost* per unit **(VC)**

Break Even Examples

1)

- Over the course of the next year, you are given the following projected data:
- Sales = $500 K
- FC = $100 K
- VC = 75% of sales
- What is the $ BEP

$$B.E.(\$) = \frac{100{,}000}{\left(1 - \frac{.75x500{,}000}{500{,}000}\right)}$$

Therefore the break-even point is $400,000.

2)

The key word here is *units*; therefore we have to use the second formula:

$$B.E.(units) = \frac{FC\ (Fixed\ Costs)}{UC\ (Unit\ Contribution)}$$

The *fixed costs* are the sum of **all the fixed costs** given:

- Yearly Insurance Expense - $60,000
- Yearly Rent Expense - $12,000
- Annual Salaries - $130,000
  (**Add** them together) = $202,000

➢ Unit Contribution = SP (per unit) – VC (per unit)

Selling price per unit (SP) = $10.00

VC (sum of all the variable costs):

- Wages per unit: $2.25
- Overhead costs per unit: $2.00
- Raw materials per unit: $3.25
  (total) = $7.50

So, Unit contribution = SP (10.00) – VC (7.50) = $2.50

We can finally solve:

$$B.E.(units) = \frac{\$202{,}000}{\$2.50}$$

Therefore **80,800 units** must be sold to break even.

Accounting

Accounting is an information system for the complete processing of financial information

- **Financial Statements:**
  - Statement of cash flow
  - Statement of returned earning
  - Balance Sheet
  - Income Statement

    Only worry about these highlighted ones***

Balance Sheet: keeps a record of assets and liabilities and looks at shareholders' equity (owners' equity)

- Snapshot of the financial condition of an organization or business at a certain point in time
- Looks at what the company owns (*assets*) and what the company owes (*liabilities and shareholder equity*)
- Assets are on ***the left*** while Liabilities and Shareholders' Equity are on ***the right***

Example of a typical Balance Sheet:

Balance Sheet for Wal-Mart
As of Jan 31, 2006

Assets		**Liabilities and Shareholders' Equity**	
Current Assets:		*Current Liabilities:*	
Cash and Cash Equivalents	6,414	Commercial Paper	3,754
Receivables	2,662	Accounts Payable	25,373
Inventories	32,191	Accrued Liabilities	13,465
Prepaid Expenses and Other	2,557	Accrued Income Taxes	1,340
Total Current Assets	43,824	Long-term Debt, due within one year	4,595
		Obligations Under Capital Leases, due within one year	299
Property and Equipment, at cost:		**Total Current Liabilities**	48,826
Land	16,643		
Buildings and Improvements	56,163	Long-term Debt	26,429
Fixtures and Equipment	22,750	Long-term Obligations Under Capital Leases	3,742
Transportation Equipment	1,746	Deferred Income Taxes and Other	4,552
Total Property and Equipment, at cost:	97,302	Minority Interest	1,467
Less Accumulated Depreciation	21,427		
Property and Equipment, net	75,875	*Shareholders' Equity:*	
		Preferred Stock	0
Property Under Capital Lease:	5,578	Common Stock	417
Less Accumulated Amortization	2,163	Capital in Excess of Par Value	2,596
		Accumulated Other Comprehensive Income	1,053
Property Under Capital Lease, net	3,415	Retained Earnings	49,105
Goodwill	12,168		
Other Assets and Deferred Charges	2,885	**Total Shareholders' Equity**	53,171
Total Assets	138,187	**Total Liabilities and Shareholders' Equity**	138,187

Types of Assets

- **Current Assets** (assets that are expected to be turned into cash within one year)
- They are listed in the balance sheet in order of *declining liquidity* (how quickly they can be converted to cash)
- **Long-term Assets** (assets that are going to be used by the company for a very long time, they are tangible (we can *literally touch* them))

List of Current Assets

- ✓ **Marketable Securities** (short term investment, converts to cash < 6 months)
- ✓ **Treasury Bill** (short term government investment, converts to cash < 1 year)
- ✓ **Accounts Receivable** (money owed to us for services we've provided < 31 days)
- ✓ **Notes Receivable** (money owed to us from other businesses includes interest < 1 year)
- ✓ **Inventories** (amount of goods on hand that has yet to be sold)
- ✓ **Prepaid Expenses** (expenses that we have prepaid and are recorded as assets until they are used up e.g office supplies, prepaid rent < 1 year)

List of Fixed Assets (Long term assets)

- ✓ **Land** (land that is bought for use by the business)
- ✓ **Building** (building bought for use by the business)
- ✓ **Equipment** (equipment bought for use by the business)

Types of Liabilities

- **Current liabilities:** debts that we expect to pay back within a year
  Examples:
  - ✓ Interest Payable
  - ✓ Accounts Payable
  - ✓ Taxes Payable
  - ✓ Wages Payable
  - ✓ Notes Payable
  - ✓ Dividends Payable

- **Long-term liabilities**: debts that will take longer than one year to pay off
  - ✓ Bank Loan
  - ✓ Bonds Payable

Shareholders' Equity

- Owners residual interest of the company's assets

- ✓ **Common Stock:** when you issue the stock, how much it is originally worth, (when you issue stock, it goes to the owners of the company making us liable to the owners)
- ✓ **Retained Earnings:** can be received from the income statement (at the end of the day, the money that is available in the company, you can retain it in the company or you can distribute is as dividends to shareholders)

How do we Calculate Depreciation?

There are two ways to do so, the straight-line method or the declining balance method. For this course you only have to worry about the ***straight-line method.***

Straight-Line Method of Depreciation

- The value of many fixed assets goes down as it is used up, for this reason we have to adjust for depreciation
- Deprecation is simply: The loss of value of a particular asset over a period time
- What is straight-line method: the value of the asset decreases by the same amount each year

Important terms to know to calculate:

- ➢ **Book Value:** the value at which the asset was purchased (this value is given on balance sheet)
- ➢ **Useful life:** an estimate of the expected useful life of the asset (this is usually given in the question)
- ➢ **Salvage Value:** the value that you can derive from the asset after its useful life is equal to 0.
- ➢ **LAND NEVER DEPRECIATES!!**

How to Calculate Deprecation

Let's say you bought a high tech piece of equipment with an initial value of $8,000,000. You are told that the useful life is 10 years. You bought it in 2008. What will the depreciation amount be? What will be the accumulated depreciation?

$Deprecation = \frac{Initial\ value}{Useful\ life}$ x (# of years)

In our case = $8,000,000/10 = $800,000

This means that the equipment will depreciate each year by $800,000. To find out how much it has depreciated, simply multiply $800,000 by the number of years since it's been purchased (4 years 2008-2012) which is $800,000 x 4 = $3,200,000. This value is the accumulated depreciation value.

Balance Sheet Example Question

You are given the following data for ABC Company as of December 31st 2012:

Common Stock	$300,000
Cash	15000
Accts. Payable	4000
Taxes payable	9000
Buildings	500000
land	50000
Useful life of building(yrs)	10
Notes payable (due in 2009)	72000
wages payable	17000
Age of Building as of Dec. 06(yrs)	5
Goodwill	300000
Bonds Payable	95000
Marketable securities	15000
Inventory	125000
Accts. Receivable	45000
dividends payable	3000
Retained earnings	300000

First organize the information given into its headings so that you can easily place them into the balance sheet:

Current Assets = **RED**

Long-term Assets = **GREEN**

Other Assets = **PURPLE**

Current Liabilities = **BLUE**

Long-term Liabilities = **ORANGE**

Owners' Equity = **PINK**

***** The remaining data in black is important in order to calculate depreciation:**

Deprecation = Initial value/useful life

$500,000/10 years= $50,000 per year the building depreciates

****HOWEVER:** We are told that the age of the building is 5 years, so we have to take this into account and calculate accumulated depreciation since we bought the building. Simply multiply the Depreciation value by 5:

$50,000 X 5 = $250,000 is how much we are going to depreciate.

We now have all the information we need in order to create the balance sheet.

Balance Sheet for ABC Corporation
as at December 31, 2006

Assets				*Liabilities and Owner's Equity*		
Current Assets				Current Liabilities		
Cash	15000			Accts. Payable	4000	
Marketable securities	15000			Taxes payable	9000	
Accts. Receivable	45000			wages payable	17000	
				dividends		
Inventory	125000			payable	3000	
Total Current Assets			**200000**	Total Current Liabs.		**33000**
Long-term Assets				Long-term Liabilities		
land		50000		Bonds Payable	95000	
Buildings	500000			Notes payable	72000	
less depreciation	250000			Total Long-term Liabs.		**167000**
		250000				
Total Long-term Assets			**300000**	Owner's Equity		
				Common Stock	300000	
				Retained		
Other Assets				earnings	300000	
Goodwill	300000			Total O.E.		**600000**
Total Other Asssets			**300000**			
Total assets			**800000**	Total Liabs. And O.E.		**800000**

***** IF you did it right, your total assets should equal your total liabilities and owners' equity**

___ - This is the value we got for the accumulated depreciation part, you just subtract it from the initial value of the building.

Income Statement

- **A financial statement that gives operating results for a specific period of time**

Important Calculations You Need to Know

- **Cost of Goods Sold (COGS): = Beginning Inventory + Purchases – Ending Inventory**
- **Gross Profit: = Net Sales – COGS**
- **Net Sales: = Gross Sales – Returns**
- **Net Income Before Taxes: Sales – Operating Expenses**
- **Net Income With Taxes: Just multiply the previous value for net income by the income tax (given in the question)**

Income Statement Question

You are given the following date for XYZ Corporation for period of January 1, 2006 to December 31, 2006

Beginning Inventory	750000
General and Admin. Exp.	240000
Purchases	3000000
Ending Inventory	850000
Selling Expenses	900000
Tax Rate(%/100)	0.45
Returns	200000
Sales	8000000

Calculate the information you need:

COGS: Beginning Inventory + Purchases – Ending Inventory = 750,000+3,000,000-850,000= $2,900,000

Net Sales: Gross Sales – Returns = 8,000,000-200,000= $7,800,000

Gross Profit: Net Sales – COGS = $7,800,000 - $2,900,000 = $4,900,000

Operating Expense: Selling Expenses + Admin. Expenses = 900,000 + 240,000 = $1,140,000

Net Income Before Tax: Gross Profit – Operating Expenses = $4,900,000 - $1,140,000 = $3,760,000

IncomeTax: Net Income X Income Tax % = $3,760,000 X 0.45 = $1,692,000

XYZ Income Statement January 1 2006 – December 31 2006

Sales	8000000		
less returns	200000		
Net sales		**7800000**	
Less C.O.G.S			
Beginning Inventory	750000		
Purchases	3000000		
Total Goods on hand	3750000		
Less Ending Inventory	850000		
Total C.O.G.S.		**2900000**	
Gross Profit			**4900000**
Operating Expenses:			
Selling Expenses	900000		
General and Admin. Exp.	240000		
Total Operating Expenses			**1140000**
Net Income before taxes			**3760000**
Income tax			**1692000**
Net Income			**2068000**

Accounting Ratios

Commonly Used Ratios

- **Liquidity Ratios –** ability to pay current debts
- **Indebtedness Ratios –** relates to how much debt an organization is using
- **Operating Ratios (Activity Ratios)—**deal with the stability of the firm
- **Profitability Ratios–** measures the profit level of a business

Liquidity Ratios

Current Ratio = Current Assets/Current Liabilities

***This ratio measures a firms' ability to cover current obligations (a ratio of 2:1 is pretty good)**

Quick Ratio = $\frac{(\text{Current Assets} - \text{Inventories} + \text{Prepaid Expenses})}{\text{Current Liabilities}}$

***More strict measure of liquidity (a ratio of about 1:1 is fairly good)**

Indebtedness Ratios

Debt to Total Assets Ratio = Total Assets/Total Liabilities

***If high, means company is strongly "leveraged"**

For every dollar of assets, how much is financed with debt and owner's equity? *Why is being leveraged good?* Debt is used to make **more money** (produce more products, meet demand, etc) Debt therefore isn't always a bad thing. Debt becomes bad when we **don't have money to pay back**

Operating Ratios

Average Collection Period Ratio = Accounts Receivable/Average Daily Sales (sales / 365)

***Less than 31 days is good**

Inventory Turnover Ratio = $\frac{COGS = Cost\ of\ Goods\ Sold}{(Beginning\ Inventory + Ending\ Inventory)/2))}$

***Average # of times inventory is sold and restocked, the lower the better**

Profitability Ratios

Profit Margin Ratio = Net Income/Sales

***The % of income that is profit to company. The higher the profit margin, the better the cost controls of the company**

Return on Equity Ratio = N.I. (Net income) /Total O.E. (Owners' Equity)

***How much profit a company generates with shareholders' money**

Ratios Question

Please look at the following data and use the appropriate information to complete each ratio

Accts. Pay	10,000	Prepaid Exp.	2,500	
Mkt. Sec	5,000	Interest Pay	3,000	
Inventories Jan. 1st, 07	30,000	Sales	300,000	
Notes Payable	15,000	Purchases	45,000	
Inventories Dec. 31st, 07	10,000	Cash	10,000	
Net Income	60,000			
Owner's Equity	150,000			
Accounts Rec.	30,000			

Current Ratio

Current Ratio = Current Assets/Current Liabilities

Current Assets = (5000+10,000+30,000+2500+10,000) = $57,500

Current Liabilities = (15,000+3000+10,000) = $28,000

Current Ratio = 57,500/2,000 = 2.05

Profit Margin

Profit Margin Ratio = Net Income/Sales

Profit Margin = 60,000/300,000 = 0.20

Average Collection Period

Average Collection Period Ratio = Accounts Receivable/Average Daily Sales (sales / 365)

Average Collection Period Ratio = (30,000)/(300,000/365) = 36.50

Inventory Turnover Ratio

Inventory Turnover Ratio = $\frac{COGS=Cost\ of\ Goods\ Sold}{(Beginning\ Inventory+Ending\ Inventory)/2))}$

Inventory Turnover Ratio = $\frac{65{,}000}{20{,}000}$ **= 3.25**

Return on Equity Ratio

Return on Equity Ratio = N.I. (Net income) /Total O.E. (Owners' Equity)

Return on Equity Ratio = 60,000/150,000 = 0.40

Quick Ratio

Quick Ratio = $\frac{(\text{Current Assets} - \text{Inventories} + \text{Prepaid Expenses})}{\text{Current Liabilities}}$

Quick Ratio = $\frac{57{,}500 - 10{,}000 + 2500}{28{,}000}$ = 1.60