FINANCIAL FORECASTING IN PYTHON

Introduction to financial statements

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About this course

- Analyze data in a simple way
- Using Python
- Model different sources of data
- Financial forecasting basics

Financial statements, an introduction

- Records of financial information
- Universal format and clear structure
- Used for decision making
- Important metrics for forecasting

Types of financial statements

1. Income Statement

Income and Expenses

2. Balance Sheet

Assets, Liabilities and Capital

3. Cash Flow Statement

4. Statement of Shareholder's Equity

How financial statements are used in forecasting

- Build on the important metrics
- Shows financial health of a company
- Provides structure for solid financial forecasting

The income statement \ profit & loss statement

Two important elements:

- Gross Profit:

  DIRECT sales and costs

- Net Profit:

  INDIRECT income and expenses

Income Statement

Mark's Gadget Shop

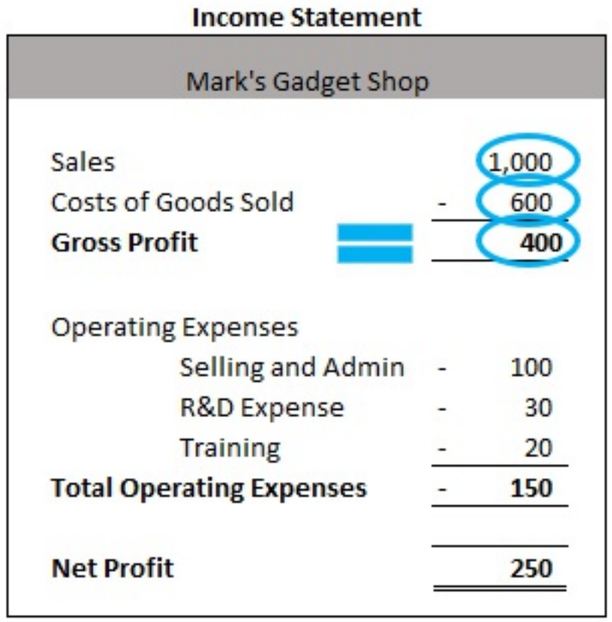
Sales		1,000
Costs of Goods Sold	-	600
Gross Profit		**400**
Operating Expenses		
Selling and Admin	-	100
R&D Expense	-	30
Training	-	20
Total Operating Expenses	-	**150**
Net Profit		**250**

Gross profit

DIRECT sales and costs

```
cogs = material_costs +
       direct_labor_costs +
       factory_costs
```

```
gross_profit = sales - cogs
```



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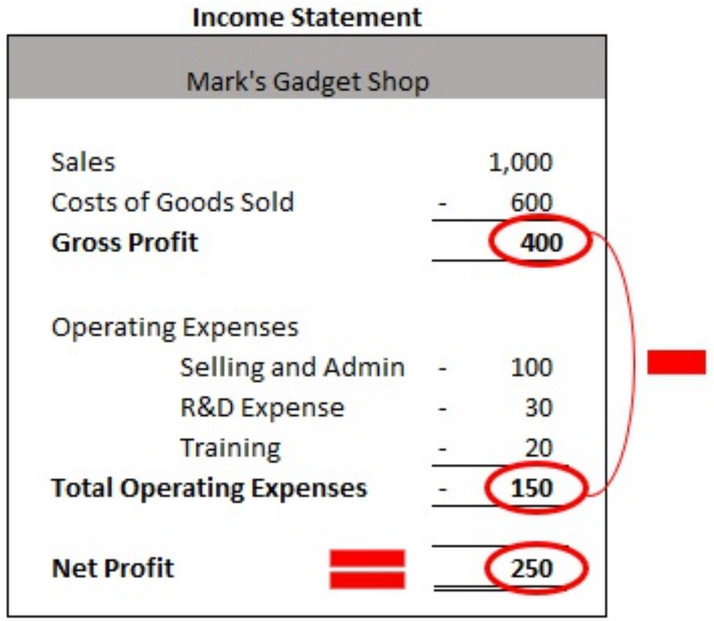
Net profit

INDIRECT income and expenses

```
opex = insurance +
       admin_sales +
       r_d +
       training_cost +
       other_non_direct_costs
```

```
net_profit = gross_profit - opex
```



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Let's practice!

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Calculating sales and the cost of goods sold

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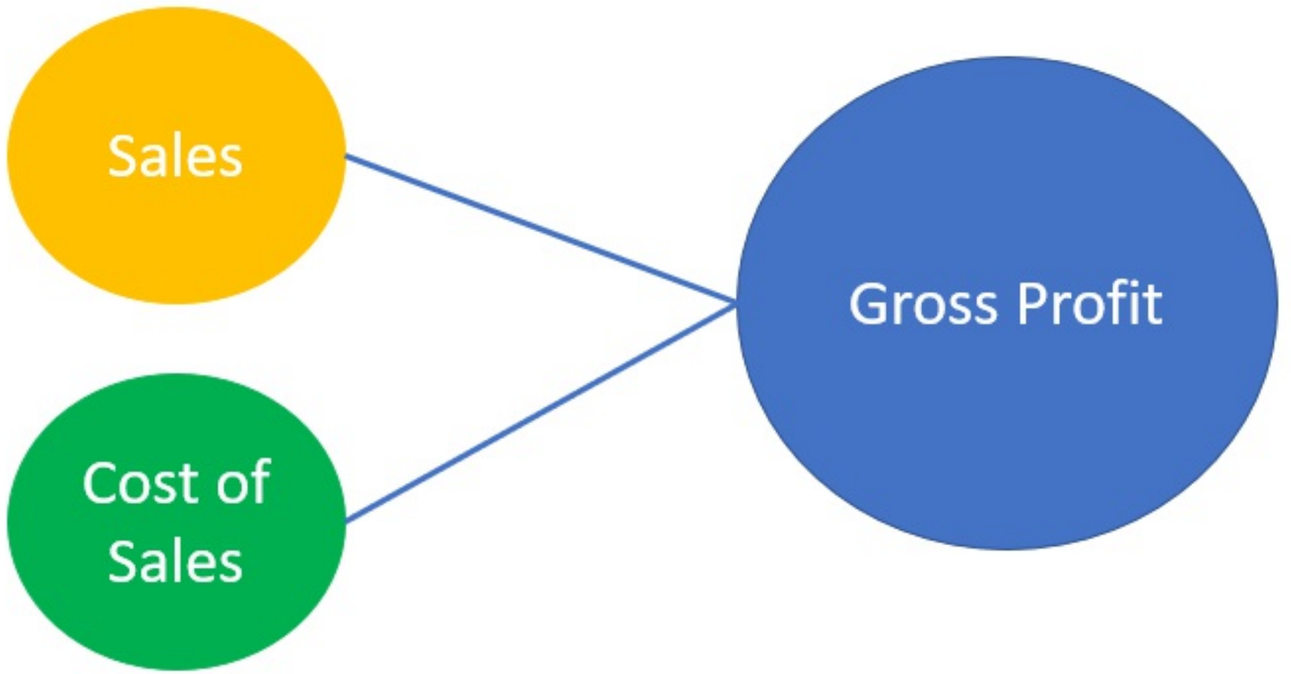
Calculating sales and the cost of goods sold



Calculating sales

Sales = Income = Revenue = Turnover

Data needed:

- Sales price per unit sp_unit
- Number of units sold units

Complexities

- Discounts (Discounted Sales Price) d_sp
- Credit sales

Calculating Cost of Goods Sold (COGS)

Data needed:

- fixed_costs
  - Costs independent of units
- Variable_costs_per_unit
  - Costs incurred per unit produced
- Inventory opening balance inv_ob
- Inventory closing balance inv_cb

What does the gross profit tell us?

- Profit margin (%)
  - gp_margin
- Analyze the profitability of our core product
- Calculate the break–even point

```
break_even = fixed_costs/(sp - variable_costs)
```

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Working with raw datasets

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Obtaining a dataset for forecasting

- Tesla Motors Inc.
- Historic information publicly available
- Income statement as .csv

First look

	A	B	C	D	E	F	G
1	TESLA INC (TSLA) CashFlowFlag INCOME STATEMENT						
2	Fiscal year ends in December. USD in millions except per share	2012-12	2013-12	2014-12	2015-12	2016-12	TTM
3	Revenue	413	2013	3198	4046	7000	10755
4	Cost of revenue	383	1557	2317	3123	5401	8536
5	Gross profit	30	456	882	924	1599	2219
6	Operating expenses						
7	Research and development	274	232	465	718	834	1269
8	Sales, General and administrative	150	286	604	922	1432	2250
9	Total operating expenses	424	518	1068	1640	2267	3520
10	Operating income	-394	-61	-187	-717	-667	-1301
11	Interest Expense	0	33	101	119	199	390
12	Other income (expense)	-2	23	3	-40	120	53
13	Income before taxes	-396	-71	-285	-876	-746	-1638
14	Provision for income taxes	0	3	9	13	27	52
15	Net income from continuing operations	-396	-74	-294	-889	-773	-1689
16	Other					98	282
17	Net income	-396	-74	-294	-889	-675	-1407
18	Net income available to common shareholders	-396	-74	-294	-889	-675	-1407
19	Earnings per share						
20	Basic	-3.69	-0.62	-2.36	-6.93	-4.68	-8.54
21	Diluted	-3.69	-0.62	-2.36	-6.93	-4.68	-8.54
22	Weighted average shares outstanding						
23	Basic	107	119	125	128	144	162
24	Diluted	107	119	125	128	144	162
25	EBITDA	-367	68	48	-334	400	246

Cleaning data in Python

```
flter =['Revenue', 'Gross profit', 'Total operating expenses', 'Net income']
```

```
for row, header in income_statement.iterrows():
    description = row[0]

    if description in flter:
        values = list(float(x) for x in row[1:len(row)])
        row = [description] + values
        result.append(row)
        print(result)
```

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