PROBLEM SET: Simulation

**Exercise 1.**

The company EZ computers has developed a new high speed computer specially for simulations in the oil industry. The company expects to keep the edge on the competition for the next three years, and sell 100 units a year. Each machine sells for 10 million, and has a production cost of 8 million. Startup costs in production are estimated at 400 million. The cost of capital for the project is 10%.

- Calculate the NPV of the project

There is uncertainty about the number of units that can be sold per year.

- Determine the minimum number of units per year that maintains profitability.

- Plot the NPV of the project as a function of units sold.

- Plot the NPV profile, NPV as a function of the cost of capital.

**Exercise 2.** *TM 3-4 Clayton Manufacturing Company*

The Clayton Manufacturing Company is considering an investment in a new automated inventory system for its warehouse that will provide cash savings to the firm over the next five years. The firm's CFO anticipates additional earnings before interest, taxes, depreciation, and amortization (EBITDA) from cost savings equalt to $200,000 for the first year of operation of the center; over the next four years, the firm estimates that this amount will grow at a rate of 5% per year. The system will require an initial investment of $800,000 that will be depreciated over a five-year period using straight-line depreciation of $160,000 per year and a zero estimated salvage value.

- Calculate the firm's annual free cash flow (FCF) for each of the next five years, where the firm's tax rate is 35%.

- If the cost of capital for the project is 12%, what is the projected NPV for the investment?

- What is the minimum year 1 dollar savings (i.e. EBITDA) required to produce a breakeven $NPV = 0$.

**Empirical**
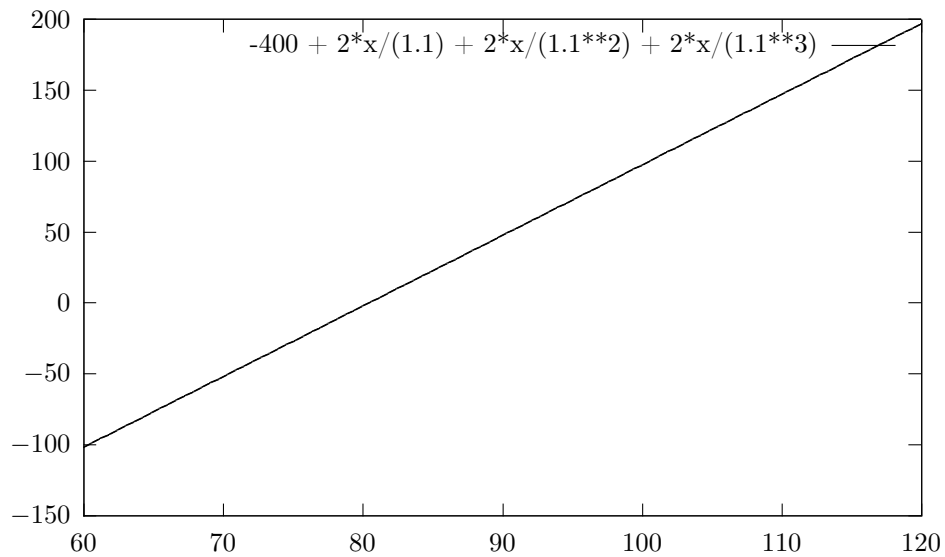
**Solutions**

PROBLEM SET: Simulation

**Exercise 1.**

- NPV

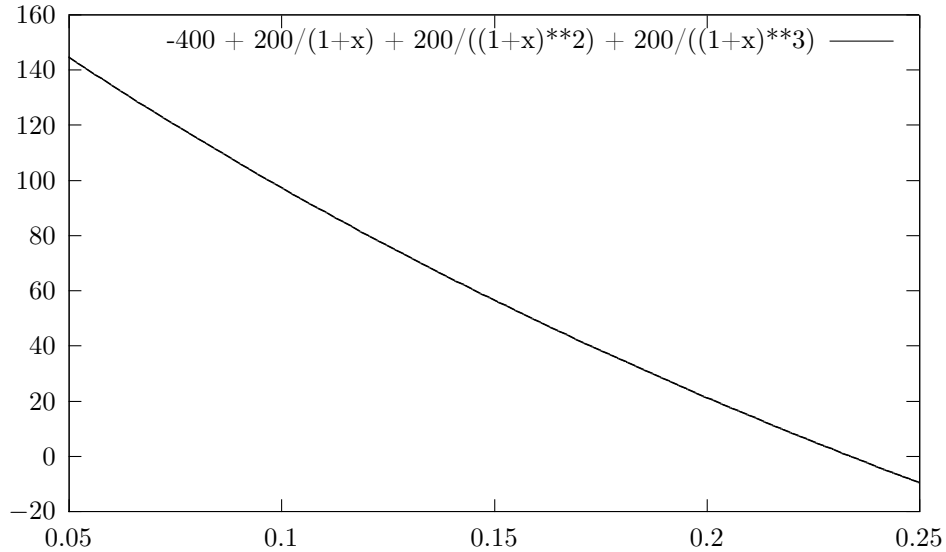| $t$ | $=$ | 0 | 1 | 2 | 3 |
|-----|-----|------|-----|-----|-----|
| $C_t$ | $=$ | $-400$ | 200 | 200 | 200 |

$$NPV = -400 + \frac{200}{(1+0.1)^1} + \frac{200}{(1+0.1)^2} + \frac{200}{(1+0.1)^3} = 97.3704$$

- NPV as a function of units sold

  Writing the NPV in terms of units sold



- NPV profile

-400 + 200/(1+x) + 200/((1+x)**2) + 200/((1+x)**3)

**Exercise 2.** *TM 3-4 Clayton Manufacturing Company*

Given

EBITDA (Year 1) $ 200 000
Growth Rate in EBITDA 5%
Initial investment $ 800 000
Depreciation (Straight line) over 5 years
Estimated salvage value $ -
Tax rate 35%
Cost of capital 12%

| | Years | | | | | |
|---|---|---|---|---|---|---|
| a. | 0 | 1 | 2 | 3 | 4 | 5 |
| EBITDA | | $ 200 000 | $ 210 000 | $ 220 500 | $ 231 525 | $ 243 101 |
| Less: Depreciation Expense | | (160 000) | (160 000) | (160 000) | (160 000) | (160 000) |
| EBIT | | $ 40 000 | $ 50 000 | $ 60 500 | $ 71 525 | $ 83 101 |
| Less: Taxes | | (14 000) | (17 500) | (21 175) | (25 034) | (29 085) |
| NOPAT | | $ 26 000 | $ 32 500 | $ 39 325 | $ 46 491 | $ 54 016 |
| Plus: Depreciation Expense | | 160 000 | 160 000 | 160 000 | 160 000 | 160 000 |
| Less: CAPEX | (800 000) | - | - | - | - | - |
| Less: Change in Working Capital | - | - | - | - | - | - |
| Project FCF | $ (800 000) | $ 186 000 | $ 192 500 | $ 199 325 | $ 206 491 | $ 214 016 |

b. NPV $ (85 926)

c. Using "Goal Seek" to solve for the EBITDA in year 1 (C5) that yields a NPV of 0 (C28).

Breakeven Year 1 EBITDA $ 233 551