1. Review of Product strategy
   - Product platform strategy
   - Product line strategy
   (emulate INTEL as "best practice")

2. Financial modeling for product development
   - Discounted cash flows (DCFs)
   - Present Value, Net Present Value (NPV)

3. Project
   - All major parts of the project must be completed by Tuesday, 11/26
   - end-game

4. HW #8 (final homework for the course)

5. Return graded HW #6 to you

6. Collect HW #7
Financial modeling for product development projects:

1. Create a base-case (nominal) financial model (in EXCEL)

(a) Estimate the timing and magnitude of all relevant cash flows:

- Development (concept, prototyping...)
- Manufacturing (Production)
- Ramp-up costs (from dev to manuf.)
- Marketing and support costs
- Sales Revenue

(b) For each quarter, determine the net cash-flow

Example: Year 3, quarter 1

Marketing: $250,000
Production: $2,000,000
Sales Revenue: $4,000,000

Net cash flow 3 = $1,750,000

for YR3, QTR1

(2x4+1) → QTR 9
(c) Compute the present value of the net cash flow for each quarter

\[ d = \text{annual discount factor} \quad (\%) \]
Typically \(10\% < d < 15\%\)

Quarterly discount factor \( = \frac{d}{4} \quad (\%)\)

(1) \( P_j = \frac{F_n}{(1 + \frac{d}{4})^{n-1}} \)

\( F_n \triangleq \text{future cash flow in Quarter } n \)

\( P_j \triangleq \text{the present value of } F_n \)

\( d = \text{annual discount factor} \)

All cash flows in eqn. (1) are on a quarterly basis
Net cash flow for Yr. 3, Qtr 1 (≡ Qtr 9) = $1,750,000

Using eqn(1), the present value of this cash flow:

\[
d \triangleq 10\% = 0.10
\]
\[
d = 2.5\% = 0.025
\]
\[
\frac{1}{4} = \frac{1}{(1+0.025)^8} = \frac{1}{(1.025)^8}
\]

= $1,436,000

(d) Add up the present value for each quarter to obtain the net present value (NPV)

- Cash flow analysis is typically performed for a time-horizon of 3-5 years ⇒ 12-20 quarters

- Net Present Value = \[\text{Present Value (Qtr 1)} + \text{PV(Qtr 2)} + \ldots + \text{PV(Qtr n)}\]
\[ NPV = \sum_{i=1}^{n-1} \text{Present Value (Qtr } i) \]

Net Present Value is the expected profit over the time-horizon (n quarters) of the financial analysis.
2. Perform a sensitivity analysis on the nominal (base case) model (in Step 1) to understand the effect of changing the input parameters in the financial model:

3. Use the sensitivity analysis (in Step 2) to understand & quantify the trade-offs between development time, dev and manf costs, and price

4. Consider the effect of changing more qualitative factors in the micro-economy (changing the discount factor)
Basic Reference:

Chapter on "Product Development Economics" in the text, U&E, PD&D

Case Study: Product development & Commercialization of a Polaroid photo printer

Prescription for your project (by Tuesday)

1/26

- Create the spread-sheets to perform the Polaroid product financial model [base-case]
  
  do all calculations in EXCEL

- Check your base-case results against the result in the text

Key step

- Create a process for obtaining the relevant cash flows (TEAM Problem Solving)
  
  - Perform the cash flow analysis for your project