Stanford University CS 183 – Startup
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ASSIGNMENT 1

Due: Thursday, April 19, 11:59PM
Note: Each student must submit their solutions to the form at http://bit.ly/Hz3GNi for grading.
To earn partial credit, please also submit your work to Coursekit in .xls, .pdf, .doc, or .docx format
Round answers to the nearest whole number, omit commas and dollar signs, and express decimals as 0.XX

PROBLEM 1: DCF

"Firm A" is a large, stable company generating steady free cash flows of $10M per year, such that:

CF_0 = $10,000,000
g = 0%
r = 10%

For simplicity's sake, we will assume that it is currently the start of year 0, and that all cash flows arrive at the start of each year. Thus, year 1's cash flows are worth ($CF_1/(1+0.10)^1$) today, at the start of year 0.

A. What are the total (cumulative) free cash flows generated by Firm A during years 1-20?
B. How much are year 10's free cash flows worth in year 0, assuming the discount rate "r" above?
C. How much are year 10's free cash flows worth in year 10?
D. What is the terminal value of the cash flows during years 21 and onward, in year 20?
E. What is the terminal value of the cash flows during years 21 and onward, in year 0?
F. What is the total value of this company in year 0, measured by ($DPV_{0-20} + TV_{21+}$)?
G. What percentage of this total company value is generated in years 11 and onward?

PROBLEM 2: DCF

"Firm Z" is a small, rapidly growing tech startup, with the following cash flow forecasts:

CF_0 = $1,000,000
g_{0-5} = 40% **g_{6-10} = 25%** **g_{11-20} = 15%** **g_{21+} = 5%**
r = 20%

To clarify the growth rates, the g_{0-5} growth rate would be applied to determine the CF growth from years 0-1, 1-2, 2-3, 3-4, 4-5 and 5-6. To determine CF growth from years 6-7, g_{6-10} should be applied.

A. What are the total (cumulative) free cash flows generated by Firm B during years 1-5?
B. What are the total (cumulative) free cash flows generated by Firm B during years 1-20?
C. What is the discounted present value (DPV) of the cash flows generated during years 1-10?

D. What is the discounted present value (DPV) of the cash flows generated during years 11-20?
E. What is the terminal value of the cash flows during years 21 and onward, in year 0?
F. What is the total value of this company in year 0, measured by ($DPV_{0\text{-}20} + TV_{21+}$)?
G. What percentage of this total company value is generated in years 0-5?
H. What percentage of this total company value is generated during years 0-10?
I. What percentage of this total company value is generated during years 11 and onward?

PROBLEM 3: PERFECT COMPETITION

"Firm C" is competing in a market of perfect competition, in equilibrium with zero barriers to entry. *(all units in $)*

The market's aggregate demand curve is given by: **P = 2300 – 4*Q**

The market's aggregate supply curve is given by: **P = 200 + 3*Q**

Firm C's marginal cost curve is given by: **MC = 200 + 100*Q**

A. What is the market's equilibrium price?
B. What is the market's equilibrium quantity?
C. Knowing only that this perfectly competitive market is in equilibrium, what are Firm C's net profits?
D. At what quantity does Firm C choose to produce, assuming it produces at all?
E. What is Firm C's average total cost at this production level?

PROBLEM 4: PERFECT COMPETITION

"Firm D" is a monopoly with 100% market share, facing the same demand curve as in Problem 3. *(all units in $)*

Firm D's marginal cost curve is given by: **MC = 175 + 0.5*Q**

A. At what quantity does Firm D choose to produce?
B. What is the market price at this production level?
C. What are Firm D's revenues?
D. What is Firm D's producer surplus? (i.e. the highest fixed costs Firm D can have and still break even)