1. Starting from the Gordon Growth Model (the Dividend Discount Model with constant growth), show how the P/E ratio is related to the fundamentals of the firm.

**DDM:**

\[
P_t = \frac{D_{t+1}}{K_e - g} = \frac{E_{t+1}(\text{Payout Ratio})}{K_e - g} = \frac{E_{t+1}(1 - \text{Reinvestment Rate})}{K_e - g} = \frac{E_{t+1}(1 - \frac{g}{\text{ROE}})}{K_e - g} = \frac{E_t(1 + g)(1 - \frac{g}{\text{ROE}})}{K_e - g}
\]

Divide by \(E_{t+1}\) to get the forward P/E ratio or divide by \(E_t\) to get the current P/E ratio:

\[
\frac{P_t}{E_{t+1}} = \frac{(1 - \frac{g}{\text{ROE}})}{K_e - g} \quad \frac{P_t}{E_t} = \frac{(1 + g)(1 - \frac{g}{\text{ROE}})}{K_e - g}
\]

2. Based on your answer to (1), estimate the expected P/E ratio for a firm that has long-term expected growth of 6%, an ROE of 13%, and a cost of equity of 8.5%. If the company has a current P/E ratio of 19.5, would your analysis suggest that the company is over- or undervalued?

\[
\frac{P_t}{E_t} = \frac{(1 + g)(1 - \frac{g}{\text{ROE}})}{K_e - g} = \frac{(1 + 0.06)(1 - \frac{0.06}{0.13})}{0.085 - 0.06} = 22.83
\]

Since the firm's actual P/E of 19.5 is less than our restimated value of 22.83, the company is undervalued.
3. Nike’s stock price and shares outstanding as of May 31, 2012 were $108.18 and 458 million. Calculate the P/E ratio for Nike based on this information and the EPS from the most recent fiscal year. Recalculate an adjusted version of the P/E ratio by dividing the current market value of equity by the net income from the most recent fiscal year, incorporating all appropriate adjustments (Note that all of the information you need to complete these calculations is contained in the previous homework solutions). How did the ratio change after incorporating the adjustments, and why?

\[
\text{Price} = 108.18 \\
\text{EPS} = 4.83 \\
\text{Net Income} = 2223m \\
\text{Equity}_{MV} = 108.18(458m) = 49,546.44m \\
\text{Debt}_{MV} = 391.0m \text{ (lecture 2 HW)} \\
\text{Operating Lease Debt} = 1929.0m \text{ (lecture 3 HW)} \\
K_d = 2.63\% \text{ (lecture 2 HW)} \\
\text{Option Value} = 1512.86m \text{ (lecture 5 HW)} \\
\text{Cash & Investments} = 3986m \text{ (lecture 5 HW)} \\
\text{Marginal Tax Rate} = 24.8\% \text{ (lecture 3 HW)} \\
\text{Non Operating Expenses} = 54m \text{ (lecture 2 HW)} \\
\text{Investment Income} = 30m \text{ (lecture 2 HW)}
\]

\[
\frac{P}{E} = \frac{108.18}{4.83} = 22.40 \\
\frac{\text{Adj } P}{\text{Adj } E} = \frac{\text{Adj Equity}_{MV}}{\text{Adj Net Income}} = \frac{49546.44 + 1512.86(1-.248) - 3986}{2223 + (54-30)(1-.248)} = \frac{46698.11}{2241.05} = 20.84
\]

The reduction in P/E results primarily from the elimination of cash & investments from the numerator. Note that I could also adjust Net Income to reflect the capitalization of R&D expenses, as discussed in the lecture 3 homework. Some analysts also suggest adding back the total amount of R&D expense. However, these are subjective adjustments and not all analysts would apply them. If they are applied, they should be applied consistently across firms.
4. Using information from the end of Nike’s most recent fiscal year (May 31, 2012), calculate the Enterprise Value to EBITDA ratio for Nike. Recalculate an adjusted version of the ratio, incorporating all appropriate adjustments (Note that all of the information you need to complete these calculations is contained in the previous homework solutions). How did the ratio change after incorporating the adjustments, and why?

Depreciation & Amortization = 395 (lecture 3 HW)

\[ EBITDA = 3040 + 395 = 3435 \]

\[ \frac{EntValue}{EBITDA} = \frac{49546.44 + 391.0 - 3986}{3435} = 13.38 \]

\[ \frac{Adj\ EntValue}{EBITDA} = \frac{(49546.44 + 1512.86(1-.248)) + (391.0 + 1929.1) - 3986}{3435 + (1929.1)(.0263)} = \frac{49018.21}{3485.74} = 14.06 \]

The increase in the ratio reflects that the adjustment for leases and employee options in the numerator outweighs the operating lease adjustment in the denominator. As in problem 3, note that I could also adjust EBITDA to reflect the capitalization of R&D expenses. McKinsey also suggests using EBITA rather than EBITDA, as depreciation reflects a real economic expense for most firms and should therefore be subtracted. In a sense, this is moving us toward a measure of free cash flow rather than EBITDA. These subjective adjustments may be applied by some analysts. If they are applied they must be applied consistently across firms.