**Problem 1**

a. Unlevered beta = 1
   Total beta = 2.5
   Cost of equity = 15.00% ! Use total beta because buyer is not diversified
   Return on capital = 0.175 ! 280/1600
   Reinvestment rate = 0.22857143 !4%/17.5%

   EBIT (1-t) $280.00
   - Reinvestment $64.00 ! 22.86% of EBIT (1-t)
   FCFF $216.00

   Value of firm = $2,042.18 ! 224 (1.04)/(.15-.04)

b. Unlevered beta = 1 ! IPO valuation: use market beta
   Cost of equity = 9.00%
   Return on capital= 0.15 ! Using reestimated return on capital
   Reinvestment rate = 0.26666667 ! 3.5%/15%
   EBIT (1-t) $240.00 ! Reestimate operating income with 40% tax rate
   - Reinvestment $64.00 ! 26.67% of 240
   FCFF $176.00

   Value of firm = $3,660.80 ! 176 (1.04)/(.09-.04)

c. There should be an illiquidity discount in the private transaction but not on the IPO.

**Problem 2**

Part a
Value of commercial product = $88.63
Value of R&D = $45.00
Total = $133.63

Market value of firm = $240.00
Value of patent = $106.37

Part b
If the firm develops the patent today, you will replace the option value above with the NPV
NPV = $49.39
Change in value = -$56.98 ! 49.39 - 106.37
New firm value = $183.02 ! 240 - 56.98