There are three parts to this document on separate pages

I. The description of the case
II. Hints for the steps you need to take (don't look at this until you try to figure out what you need to do for yourself)
III. The answers

I. Evaluating the AI Project at Cyberdyne

You are a financial analyst working for Cyberdyne Systems, a Northern California computer technology company. The research and development division of the company has developed a new microprocessor which will significantly improve the performance of artificial intelligence systems. The company has considering making a bid to develop a computerized artificially intelligent weapons management system for the US Department of Defense. It is your job to determine the financial viability of this project.

Given the information below, answer the following questions.

1) Assuming the most-likely projections of future costs, what is the smallest amount the company could bid? Assume the payments to the company will be made evenly over 20 years starting in year 1.

2) Assuming design and maintenance costs are at their high end, what is the smallest amount the company should bid? Does uncertainty about design costs or maintenance costs have the biggest effect on the minimum bid?

Pro Forma Income Statement for the upcoming year

Revenue	$200m
Operating Ex.	$150m
EBIT	$50m
Interest	$10m
Taxes	$10m
Earnings	$30m

These numbers apply to year 1. Assume that the company will reinvest 60% of its earnings and pay the remainder as dividends. It is expected that earnings will grow indefinitely at 8%.

The Capital Structure.

The company has issued 100,000 10% semiannual bonds with a par value of $1,000 and a maturity of 10 years. The bonds sell for $1,100. Currently there are 10m shares outstanding at a market price of $25/share. Assume that the company's target capital structure equals their current market capital structure.

Projected Costs of the Project

In year 1, it will cost $40M to begin the product. For years 2-6, the development costs are expected to be $60M per year, although the actual costs could be plus or minus 30%. In years 7-20 the company will be responsible for maintenance costs of $8M per year, although the actual costs could be plus or minus 75%. The contract ends after the 20 years.

Other Assumptions

You can use the average tax rate paid when making your calculation of the cost of debt. Use the market required return assuming constant dividend growth in your calculation of the cost of equity.

II. Hints: Here are the steps you need to go through.

Find the market value of debt and equity.

Calculate the shares of debt and equity.

Find the cost of debt and equity.

Calculate the WACC.

Calculate the present value of the costs assuming the most-likely results.

Calculate the payment over 20 years that would have the same present value. This is your minimum (break-even) bid.

For the worst case scenario, assume that both types of costs are at the high point of their ranges and find the present value of the costs and the break-even bid.

Compare the differences in the present value of the costs between the worst and most-likely cases.

III. Answers

Note on rounding: Generally I've rounded interest rates to 1/100 of a percent and dollars to the nearest $10,000. Your answers might differ slight if you round differently or round at different points in a calculation. For the purposes of this exercise, it doesn't matter.

Find the market value of debt and equity

      Market Value of Debt = (1000,000 Bonds)($1,100/Bond) = $110m.

      Market Value of Equity = (10m Shares)($25 Price per Share) = $250m

Calculate the shares of debt and equity

      Total Capital = $360m

      Share of Debt = ($110)/($360) = 0.31

      Share of Equity = ($250m)/($360m) = 0.69

Find the cost of debt and equity

      The yield to maturity on the bonds is (N=20, I = ?, PV = -1100, PMT = 50, FV = 1000)

       = 4.25x2= 8.5

      (EBIT-Interest)(Tax Rate) = Taxes

      (50-10)(t)=10 , t = 0.25

      Cost of debt = 8.5(0.75) = 6.38%

      Dividends/Share = (Earnings)(1-Plowback Rate)/(Number of Shares)

      ($30m)(.4)/10m = $1.2

      $25 = 1.2/(k-0.08)

      Cost of equity = 1.2/25 +.08 = .128 or 12.8%

Calculate the WACC

      WACC = (0.31)(6.38%) + (0.69)(12.8%) = 10.81%

Calculate the present value of the costs assuming the most likely results

= 40/(1.1081)

+ (N=5, I= 10.81%, PV= ?, PMT=60, FV=0)/ (1.1081)

+ (N=14, I = 10.81%, PV=?, PMT=8, FV=0)/(1.1081)^6

= 36.10

+ 222.82/1.1081 = 201.08

+ 56.42/1.8513 = 30.48

= 267.66

Calculate the payment over 20 years that would have the same present value. This is your minimum (break-even) bid.

(N=20, I = 10.81%, PV=266.67, PMT=?, FV=0)

= 33.19

For the worst case scenario, assume that both types of costs are at the high point of their ranges and find the present value of the costs and the break-even bid.

= 40/(1.1081)

+ (N=5, I = 10.81%, PV=?, PMT=78, FV=0)/(1.1081)

+ (N=14, I = 10.81%, PV=?, PMT=14, FV=0)/(1.1081)^6

= 36.10

+ 289.66/1.1081 = 261.40

+ 98.73/1.8513 = 53.33

= 350.83

(N=20, I = 10.81%, PV=350.83, PMT=?, FV=0)

= 43.51

Compare the differences in the present value of the costs between the worst and most-likely cases.

Additional cost from higher development costs = 261.40 – 201.08 = 60.32
Additional cost from higher maintenance costs = 53.33 – 30.48 =22.85

Even though the maintenance costs have a higher percentage change and are for a longer number of years the additional costs associated with development are still higher since that percentage is off a larger base and the costs are paid more closely to the present.