FINANCE ASSIGNMENT HELP

There are three questions, each on a separate page. Please do the assignment on the spreadsheet. The assignment is to be handed in as a Word document. In Word, relevant chunks of Excel spreadsheet can be copied and pasted into your document with the “paste special” command and the “Picture (Enhanced metafile)” option. Please show all working. In Excel this entails showing and labelling all inputs and outputs, and stating what the calculation method is (ie, “PV of annuity calculated with the PV function”. Timeline diagrams are required in ALL of these questions. You may draw these with a pencil or a ballpoint pen and scan it in if you prefer or draft them with computer tools.

Question 1: Taussig Technologies Corporation

Taussig Technologies Corporation (TTC) has been growing at a rate of 20 percent per year in recent years. This same growth rate is expected to last for **another 3 years before dropping back to the long-term growth rate**

(a) If the last dividend paid (yesterday) was $1.60, and investors require a return of 10% on holding TTC’s shares, and the firm’s long-term growth rate is expected to be 6%, what is TTC’s stock worth today? What are its expected dividend yield and capital gains yield for the year just starting?

(b) Now assume that TTC’s period of supernormal growth is to last for 6 years rather than 3 years. Explain how would this impact on its price, dividend yield, and capital gains yield? Also please compute the price, dividend yield and capital gains yield. (c) What will be TTC’s dividend yield and capital gains yield once its period of supernormal growth ends? Why should you be able to write down the answer without doing any calculations?

Question 2 Crown of Thorns Fund

Crown of Thorns Ltd faces the strong possibility that it will be saddled with a contingent liability of $10 million in exactly six years time. We do not care what this liability is, but it is our job to make sure the company has the funds to meet it if it loses the current related legal battle. In current market conditions, the fund will generate a return of 5% per annum net of taxes and other expenses.

(a) If Crown of Thorns plans to deposit uniform amounts into the fund at the end of every quarter (three months), what is the size of this quarterly deposit?

(b) At the start of the fourth year the annual return on the fund rises to 7% net of taxes and other expenses. What is the size of each quarterly payment from this time forth?

[Hint: You have to do four calculations: (i) You need to know the value of the fund at the end of the first 3 years, (ii) How much that value will grow to by itself by the end of year 6, (iii) How much more cash must be found to meet the $10m requirement at the end of year 6, and (iv) What quarterly sum must be invested to achieve this? One more page yet! 3

Question 3: Jones-Campbell Ltd Replacement Project. The Jones Campbell Ltd is contemplating the replacement of one of its blending machines with a newer and more efficient one. The old machine has a book value of $600 000 and a remaining useful life of six years. The lifespan of the project is also **six years**. The company does not expect to realise any return from scrapping the old machine in six years, but it can sell it now to another company in the industry for $300 000. The old machine is being depreciated towards a zero salvage value, or by $100 000 per year, using the straight-line method, as required by the country's tax authority.

The new machine has a purchase price of $2 million, a tax depreciation life of **five years**[1], and an estimated salvage value of $75 000. It is expected to economise on electric power usage, labour and repair costs, as well as to reduce the product spoilage rate. Sales of the blended product from the old machine are $900,000 per year and annual operating costs (excluding depreciation) are $650,000. If the new machine is installed, its greater output capability will cause sales to be $1,150,000 per year with annual operating costs (excluding depreciation) of $400,000. However, the new machine will require an investment in working capital of $40,000 which was not necessary for the old machine. (This is a new spare parts inventory.) This investment is fully recoverable at the end of the life of the machine; and working capital requirements are not expected to vary from year to year over the life of the new machine. The company is in the 30 per cent tax bracket, and it has a 10.5 percent cost of capital. The company is operating in a country where there is a capital gains tax of 30%.

Required:

The depreciation on the new machine is over a shorter time than for the existing machine. This is because of some quirk in the country's tax laws which contain a schedule specifying that the old type of machine had a different depreciation life-span from the new type of machine that would replace it. The new machine's depreciation life-span is definitely only 5 years.

1. What is the initial cash outlay required for the new machine?

2. What are the after-tax operating cash flows from operations in years one to five?

3. What are the after-tax operating cash flows in year six?

4. What are the after-tax terminal (salvage etc) cash flows from the new machine in year six?

5. Should Jones-Campbell Ltd purchase the new machine? Support your answer with a net present value calculation.

6. Calculate the IRR, discounted payback period, and also the annual equivalent benefit for this replacement project.

Solution to Question 1

In the given problem we have two stages of growth, an extraordinary growth phase that lasts n years and a stable growth phase that lasts forever afterwards.

Value of the Stock (P_o) = PV of Dividends during extraordinary phase + PV of terminal price

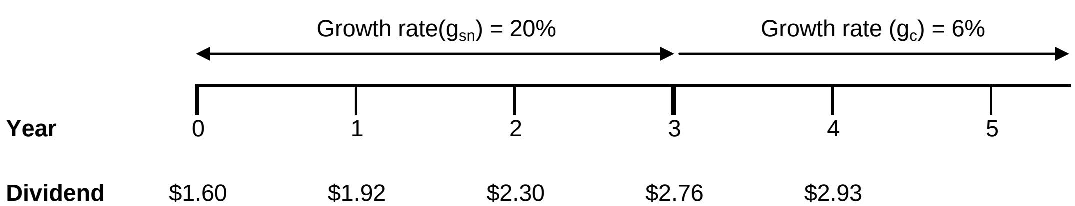
$$P_0 = \sum \frac{DPS_t}{(1+k_e)} + \frac{P_n}{(1+k_e)^n} \quad \text{where } P_n = \frac{DPS_{n+1}}{(k_e - g_c)}$$

where,

DPS_t	=	Expected dividends per share in year t
k_e	=	Cost of Equity
n	=	Supernormal growth period
P_n	=	Price (terminal value) at the end of year n
g_{sn}	=	Extraordinary growth rate for the first n years
g_c	=	Steady state growth rate forever after year n

Solution to part (a)

The data given can be illustrated in the time line as follows:



Given a required return of 10%, we can calculate the Terminal Value (P_3) of the stock at the end of 3rd year as follows:

$$P_3 = \frac{DPS_4}{(k_e - g_c)} = \frac{\$2.93}{(0.10\text{-}0.06)} = \$73.25$$

Thus, we compute the value of the stock today as follows:

$$P_0 = \frac{\$1.92}{(1+0.10)} + \frac{\$2.30}{(1+0.10)^2} + \frac{\$2.76}{(1+0.10)^3} + \frac{\$73.25}{(1+0.10)^3}$$

P_o = \$1.75 + \$1.90 + \$2.07 + \$55.03

P_o = \$60.75

Similarly; we can calculate the price of the stock (P_1) at the end of the first year as follows:

$$P_1 = \frac{\$2.30}{(1+0.10)^1} + \frac{\$2.76}{(1+0.10)^2} + \frac{\$73.25}{(1+0.10)^2}$$

P_1 =\$(2.09 + 2.28 + 60.54)

P_1 = \$64.91

The Dividend Yield is given by:

$$\text{Dividend Yield} = \frac{\text{Expected Dividend}}{\text{Current Price}} \times 100\%$$

= (1.92/60.75)*100%

= 3.16%

The Capital Gains Yield is given by:

$$\text{Capital Gains Yield} = \frac{P_{1} - P_{0}}{P_{0}} \times 100\%$$

$= [(64.91 - 60.75)/60.75]*100\%$

= 6.85%

Solution to part (b)

Growth rate(g_{sn}) = 20% (years 0–6) | Growth rate (g_c) = 6% (from year 6)

Year	0	1	2	3	4	5	6	7	8
Dividend	$1.60	$1.92	$2.30	$2.76	$3.32	$3.98	$4.78	$5.07	

Supernormal growth will lead to higher stock price and hence lower dividend and capital gain yield.

Terminal Value (P_6) at the end of year 6 =

$$P_6 = \frac{DPS_7}{(k_e - g_c)} = \frac{\$5.07}{(0.10-0.06)} = \$126.67$$

Thus, the value of the share today (P_o) is calculated as follows:

$$P_0 = \frac{\$1.92}{(1+0.10)} + \frac{\$2.30}{(1+0.10)^2} + \frac{\$2.76}{(1+0.10)^3} + \frac{\$3.32}{(1+0.10)^4} + \frac{\$3.98}{(1+0.10)^5} + \frac{\$4.78}{(1+0.10)^6} + \frac{\$126.67}{(1+0.10)^6}$$

= **$84.66**

The Value of the share one year from now is calculated as follows:

$$P_1 = \frac{\$2.30}{(1+0.10)^1} + \frac{\$2.76}{(1+0.10)^2} + \frac{\$3.32}{(1+0.10)^3} + \frac{\$3.98}{(1+0.10)^4} + \frac{\$4.78}{(1+0.10)^5} + \frac{\$126.67}{(1+0.10)^5}$$

=**$91.20**

Dividend Yield = (1.92/84.66)*100%

= 2.27%

Capital Gains Yield = (91.20-84.66)/84.66

= 7.73%

This is in line with the conclusion that the present stock value will increase and thus the dividend and capital gain yield will decrease.

Solution to part (c)

Once the period of supernormal growth ends the stocks dividend yield will be 10%-6% = 4%

And its capital Gain Yield will be the constant growth rate of the stock = 6%

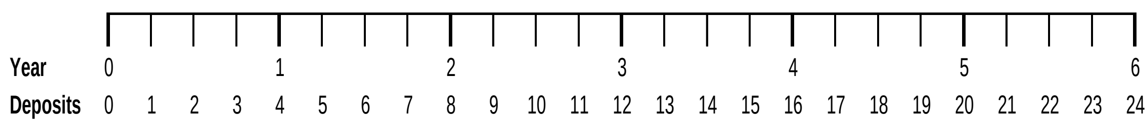
This can be said without any calculations because, the total return for the investor is 10% and out of this, the company will keep back 6% of the cash flows for future growth as per the growth of the company. The remaining 4% will be dividend distribution. Simply put, the rate of return needed by the investor will be partially satisfied by the growth of the stick at 6% and the other part will come from growth in dividend at 4%.

Solution to Question 2

Solution to part (a)

Crown of Thorns Ltd. makes quarterly deposits into the fund at the end of each quarter for a period of 6 years to meet the contingent liability of $10,000,000 at the end of year 6.

The deposits made by the company in the fund can be illustrated in the timeline below:



Assuming the return of 5% on the fund as return compounded quarterly,

Quarterly interest rate(i) = 5%/4 = 1.25%

No. of periods (n) = 6 years * 4 = 24

Future value of the liability at the end of 6 years = $10,000,000

Let the quarterly deposits made by the company be C

We know the formula for the Future Value of the Annuity is as follows:

$FV = (C/i)\,[(1+i)^n - 1]$

$C = (i)\,(FV) / [(1+i)^n - 1]$

$C = \$\{0.0125\,(10{,}000{,}000) / [(1.0125^{24}) - 1]\}$

$C = \$359{,}866.48$

Solution to part (b)

As at the end of 3 years,

The company has till date made quarterly deposits into the fund at the end of each quarter for the first 3 years.

Value of the accumulated fund at the end of 3 years, i.e. (3*4=12 deposits)

FV = (C/i) [(1+i)^n – 1]

FV = (359866.48/0.0125) [(1.0125^12) – 1]

FV = $4,628,013

Thus, the value of this accumulated amount at the end of 6 years at the new rate of return of 7% = (7/4) = 1.75% per quarter

FV at the end of year 6 = $4,628,013[(1+0.0175)^12]

FV = $5,699,117.16

Thus amount of extra funds needed to meet the $10 million liability at the end of Year 6

= $(10,000,000 - 5,699,117.16)

= $4,300,882.84

Thus, the amount of quarterly installments needed to accumulate the aforesaid amount in the next three years (12 deposits) is calculated as follows:

Quarterly interest rate (i) = 7%/4 = 1.75%

No. of periods (n) = 3 years * 4 = 12

Future value of the Liability at the end of 3 years = $4,300,882.84

C = (i) (FV) / [(1+i)^n – 1]

C = ${0.0175 (4,300,882.84) / [(1.0175^12) – 1]}

C = $325,205.98

Thus from fourth year onwards, the company needs to deposit an amount of $325,205.98 in the fund to accumulate the required amount to fund the liability of $10 million at the end of year 6.

Solution to Question 3:

Solution to part (1)

Net Initial Cash Outflow = Cost of new machine + Net inflow from the sale of old machine + Initial Working capital outlay

i) Cost of new machine

Purchase price of the new machine	$2,000,000

ii) Analysis of the sale proceeds and tax savings thereon on the disposal of old machine (assuming that the old machine is sold):

Sale of old machine		$300,000
Book Value of the old machine:	$600,000	
Less: Sale Procceds:	$300,000	
Loss on sale	**$300,000**	
Tax Savings ($300000*0.30)		$90,000
After-tax salvage value (Net Inflow from the sale of old machine)		**$390,000**

Tax benefit for loss on sale of old machine has been considered

This $390,000 must be treated as a cash inflow and reflected in the initial outlay.

iii) Change in net working capital

Investment in net working capital	$40,000

The initial cash outlay is computed as follows:

Initial cash outlay:	
Cost of new machine	$2,000,000
Less: Net inflow from the sale of old machine	$390,000
Investment in Net Working Capital	$40,000
Net initial investment cash outflow	**$1,650,000**

Thus, the initial cash outlay at time t_o is $1,650,000

Solution to part (2)

Operating cash flows are the incremental cash inflows over the capital asset's economic life.

Operating cash flows are defined as:

Operating cash flow = [(⌂revenue - ⌂cost)(1-t)] + ⌂depreciation*tax rate

Increase in revenue = $(1,150,000 – 9,00,000) = $250,000

Decrease in cost = $(650,000 – 400,000) = $250,000

Depreciation on new machine = $(2,000,000 – 750,000)/5 = $385,000

Depreciation on old machine = $100,000

Thus increase in depreciation = $(385,000 – 100,000) =$285,000

Thus after tax operating cash flows from operations in year one to five

= ${[250,000 – (-250,000)] (1-0.30) + 285,000(0.30)}

= $(350,000 + 85500)

= $435,500

Solution to part (3)

The various components of operating cash flows in Year 6 are as follows:

Increase in revenue = \$(1,150,000 – 9,00,000) = \$250,000

Decrease in cost = \$(650,000 – 400,000) = \$250,000

Depreciation on old machine = \$100,000

Depreciation on new machine = \$0

*(as tax depreciation life of new machine = 5 years)

The after tax operating cash flows from operations in year 6 =

Operating cash flow = [(⌂revenue - ⌂cost)(1-t)] + ⌂depreciation*tax rate

= \${[250,000 – (-250,000)] (1-0.30) + (0-100,000)(0.30)}

= \$(350,000 – 30,000)

= \$320,000

Solution to part (4)

Terminal year cash flows occur at the end of assets useful life. This includes the cash inflows such as after tax salvage value of the asset. The salvage cash flow from sale of new machine will be 52,500 which is equivalent to {75000*(1-.3)}

Salvage value of the new machine:	\$75,000
Capital Gains Tax on salvage value(\$75000*0.30)	-\$22,500
Return of Net Working Capital	\$40,000
Operating Cash Flow in year 6	\$320,000
Terminal Year Net Cash Flow	\$412,500

Solution to part (5)

Given Jones's incremental cash flows and a cost of capital of 10.5%, Net Present Value (NPV) of the project can be computed as:

NPV = -\$1,650,000 + \$435500 PVIFA (10.5%,5) + \$412500 PVIF(10.5%,6)

$$NPV= \quad -1,650,000 + \frac{\$435,500}{(1+0.105)^1} + \frac{\$435,500}{(1+0.105)^2} + \frac{\$435,500}{(1+0.105)^3} + \frac{\$435,500}{(1+0.105)^4} + \frac{\$435,500}{(1+0.105)^5} + \frac{\$412,500}{(1+0.105)^6}$$

NPV = \$206,609.74

Decision: Since the NPV is positive, Jones should replace the machine with the new machine.

Solution to part (6)

IRR Based Analysis:

Given the projects cash flows, we can solve for the IRR:

$$\$1,650,000 = \frac{\$435,500}{(1+ IRR)^1} + \frac{\$435,500}{(1+ IRR)^2} + \frac{\$435,500}{(1+ IRR)^3} + \frac{\$435,500}{(1+ IRR)^4} + \frac{\$435,500}{(1+ IRR)^5} + \frac{\$412,500}{(1+ IRR)^6}.$$

IRR = 14.73%

IRR based decision: Since IRR 14.73% > WACC of 10.5%, Jones should accept the project and purchase the new machine.

Discounted Payback Period Analysis:

Given the projects cash flows, we calculate the payback period as:

Year	Cash Flow	PV of Cash Flow	Cumulative PV
1	$435,500.00	$394,117.65	$394,117.65
2	$435,500.00	$356,667.55	$750,785.20
3	$435,500.00	$322,776.07	$1,073,561.27
4	$435,500.00	$292,105.04	$1,365,666.31
5	$435,500.00	$264,348.45	$1,630,014.76
6	$412,500.00	$226,594.98	$1,856,609.74

Thus the discounted payback period

= 5 years + (1650000-1630014.76)/226594.98)*365 days

= 5 years 32 days

Annual Equivalent Benefit:

For the Annual Equivalent benefit approach the steps involved are as follows:

i) Find each Project's NPV

ii) Find an annuity (EAA) that equates to the project's NPV over its individual life at the WACC

iii) Select the project with the highest EAA.

Old Machine

Book Value = $600,000

Operating cash Flows from year 1 to 6

= $[(900,000 - 650,000)*(1-0.30) + 100000*0.30]

= $205,000

Salvage Value at the end of 6th year = Nil

Thus NPV = -$600,000 + $205,000 PVIFA(10.5%,6)

= $279,896.77

To calculate the EAA we have the data as follows:

PV = $279,896.77

N = 6 years

I = 10.5%

Thus, EAA = $65,210.87

New Machine

Purchase Price = $2,000,000

Investment in Working Capital = $40,000

Initial Outlay = Purchase Price + Investment in Working Capital

= $(2,000,000 + 40,000)

= $2,040,000

Operating cash Flows from year 1 to 5

= $[(1,150,000 - 400,000)*(1-0.30) + 285,000*0.30]

= $610,500

Salvage Value at the end of 5^{th} year = $75000

Thus NPV = -$2,040,000 + $610,500 PVIFA(10.5%,5) + 75000 PVIF (10.5%,5)

= $290,539.94

To calculate the EAA we have the data as follows:

PV = $290,539.94

N = 5 years

I = 10.5%

Thus, EAA = $77625.15

Thus as the annual equivalent benefit is higher for the new machine, the company should purchase the new machine.