1) Accelerator 114 Partners (A114 Partners) announced they were purchasing HAL Ltd equity for £0.7B. HAL is Britain's second largest roadside recovery firm. HAL will come fix your tire or jump your car if you are a member. In addition to A114 Partners' equity investment, HAL issued £1.5B in debt. The debt has a coupon rate of 9.4%. Interest and principal payments are due at the end of each year. The required principal payments are £0.5B per year. The loan's yield is 9.4%, which is significantly greater than the current risk-free rate of 2.1%. HAL faces a corporate tax rate of 20%.

A) Investors believe there is an 8.1% probability that the bond will default each year (conditional on not defaulting the prior year). If the bond defaults, investors expect to receive 55% of their principal back (i.e., the return in default is minus 45%). Do these numbers imply that the debt beta is positive or negative? Explain briefly and show your numbers. (10)

R_d = (1-p) r_promised + p r_default = **(1-0.081) 9.4% + 0.081 (-45%) = 5%**

R=d = r_rf + beta_d E(r_m-r_rf) = 2.1% + beta_D (8%) → 0.36 > 0

B) One advantage of debt is that the deductibility of interest lowers the firm's taxes. What is the value of the tax shield from the debt issue? Assume that if the firm defaults, the firm will be liquidated, and the tax shield disappears. Assume that no new debt is issued when this debt matures. Show your work and explain your calculations. (15)

V_TS = sum { t=1} to N Tax savings/(1+r_ts)^t
= tau D = tau r_D D / r_D
= tau r_D D /(r_D + p)
= 0.20 (**0.05**) 1.5/(1+0.05)^1 + (0.919) 0.20 (**0.05**) 1.0/(1+0.05)^2 + (0.919)^2 0.20 (0.05) 0.5 /(1+0.050^3 = 26.3

C) In the UST case we used the formula below to estimate the value of the tax shield.

$$\text{NPV}\left[\text{Debt tax shield}\right] = \frac{\tau\, r_{\text{Debt}}\, D}{r_{\text{Debt}} + p} \quad (1)$$

The value of the tax shield generated from equation (1) may be different from the value you calculated in B. What assumptions must be true for this formula to generate an accurate estimate, but are not true in HAL's case? If you get stuck on calculating the tax shield, just explain the logic to me. (10)

V_TS = 114.5 > 26.3

Paying down debt even when don't default.
Finite maturity = 3 years

D) Sometimes firms target a specific debt level as we assumed in UST ($350M, $700M, or $1,050M). Sometimes firms target a specific debt ratio (the market value of debt to the market value of assets). If a firm targets a specific debt ratio, would this raise or lower the value of the tax shield relative to the value from equation (1)? Explain completely. Assume the initial debt level (D) is the same in both cases. Do not calculate any numbers. (15)

Debt level constant or D/A constant

V_TS sum {t=1 to inf} tau r_D D /(1+r_ts)^t

Asset are growing at 6% growing perpetuity growth of g ??? -p

Discount rate r_ts = r_a

V_TS = tau r_D D /(r-g) = tau r_D D / (r_A – g)

(1-p)(1+g_a) = -p + g_a -g_ap

E) Although demand for cigarettes is declining, the market for smoking is dramatically larger than for smokeless tobacco and when you add the people exposed to secondhand smoke, the risk of litigation is much larger for the firms producing cigarettes than UST. Litigation risk is the largest source of financial distress costs for the smoking firm. True, False, or Uncertain. Explain (15)

2) Short Discussion Questions.

A) Many, but not all, business enterprises are organized as limited liability corporations which mean the equity holders can lose no more than 100% of their investment. If the obligations of the corporation to lenders are greater than the value of the assets, the equity holder has the option to walk away from the obligations and give the assets to the lenders.

1) If equity's liability was not limited, how would this change the debt β? Explain briefly. (10)

2) How would unlimited liability affect equity holders' incentive to hedge idiosyncratic risk? Explain completely. (10)

B) When a firm announces a dividend increase, the stock price often rises. This proves that dividend policy is relevant. True, False, or Uncertain. Explain your logic. (10)

C) Sometimes a firm with a lower debt to asset ratio and a higher interest coverage ratio will have a lower debt rating and a higher yield on its bond. Since firms with lower debt to asset ratios and higher interest coverage ratios are safer, how is this possible? Explain. (10)

3) Petrobras engages in oil exploration and production activities in Argentina, Bolivia, Ecuador, Peru, and Venezuela. They recently announced a large natural gas discovery. The value of Petrobras' assets one year from today (next year) depends upon the balance of demand and supply for fossil fuel energy and is specified in the table below. Assume that the correct discount rate is 9% for all cash flows (i.e., all βs are zero and the risk free rate is 9%). Assume the managers do not know the state of the world until told otherwise. Assume the states are equally likely and managers maximize the wealth of current common shareholders. There are currently 20M shares outstanding. Round your answers to one decimal (10.0 Brazilian Real or 10.0%). The numbers in the table are reports in millions of Reals (BRL).

	Very Low Energy Demand (I)	Low Energy Demand (II)	High Energy Demand (III)	Very High Energy Demand (IV)	Expected Cash Flow	Present Value
Asset Value (M)	140	250	300	410		
Preferred	140	235	235	235	211.3	193.8
Equity	0	15	65	175	63.8	58.5

A) Back in 2019, Petrobras sold preferred equity for 210M. This is also the liquidation value. The preferred matures next year (2025). The preferred equity pays a contractually specified dividend equal to 11.9% of the liquidation value at the end of each year. This year's dividend has already been paid. The preferred equity holders are promised the liquidation value of the preferred (210M) plus the dividend one year from today. What is the current market value of the preferred equity? Explain briefly (10)

Promised payment = 210 (1+0.119) = 235
V_P = 211.3/1.09 = 193.8

B) How would the yield on the preferred equity change if the asset β was positive? Assume the distribution of future asset values and the preferred equity contract does not change. This assumption applies only to question 3-B. Give me a brief qualitative answer with a logical explanation. Don't calculate any numbers. (10)

V_p = E(CF_P)/(1+r_preferred) no change in CF,
R_prefered = r_risk + beta_PR (8%)
B_pref > 0 discount rate is higher,
V_p and P_p lower

B_a = beta_pr (PR/TA) + beta_e (E/TA)

P_pr = promised payment /(1+r_promised)
P lower, r_promised is higher
More systematic risk → higher expected return on PR, but also higher promised

C) Petrobras just discovered that they can spend an additional 100M today and purchase a new oil extraction technology. The future value of the investment ranges from 90M to 150M next year (see following table). Would a firm invest in this project in an M&M world? Explain briefly. (10)

	Very Low Energy Demand (I)	Low Energy Demand (II)	High Energy Demand (III)	Very High Energy Demand (IV)	Expected Cash Flow	Present Value
Asset Value	140	250	300	410	275	252.3
Oil Field Value	90	110	130	150	120	110.1
Total Assets	230	360	430	560	395	362.4
Prefered Equty	230	235	235	235	233.7	214.4
Com Equiyt						

NPV – 100 + 120/1.09 = -100 + 110.1 = 10.1> 0

D) If Petrobras sold shares of common equity to new (outside) investors to finance the 100M investment, what fraction of the common equity would the new investors own? Explain completely. (15)

100 = k V_equity = k 147.9 → k = 100/147.6 = 67.6%
V_A – V_P = CE =362.4 – 214.4 = 147.0

New shareholders 0.676 (147) = 100
Old shareholders (1-0.676) 147 = 47.9

E) Would the current common equity shareholders want to sell $100M of common equity (to new outside investors) and make the new oil field investment? If the decision to issue common equity and invest changes the old shareholders' wealth, describe the source of this wealth creation or destruction completely. Remember Petrobras' managers do not know the true state of the world and the market knows they don't know the true state of the world. (15)

NPV(P) = NPV(P | CSI) + NPV(financing)
10.1+ No TS, No CoFD + (100 – 0.676 (147))
= 10.1 + 0 (193.8-214.4)= 10.1 – 20.6 = -10. 5
V_equity I&I = 47.9
V_equity do nothing = 58.5 = **lose 10.5**
V_pre I&I = 214.4
V_p do nothing 193.8 == 20.6 Prefere value rises 20.6

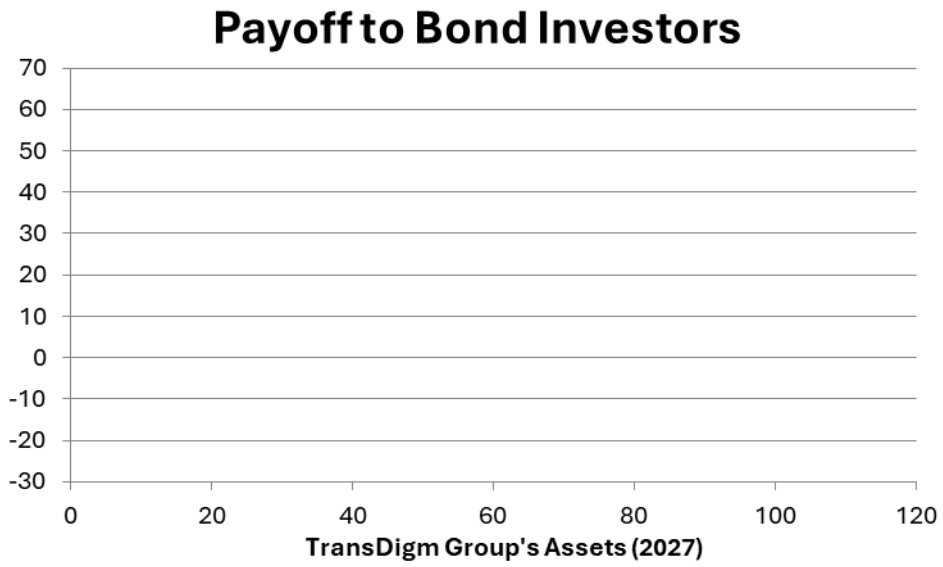
F) Instead of selling equity to outside investors, the current common equity owners could invest 100M in exchange for 80M shares. Would they prefer to sell common equity to themselves or to outsiders (as described in D)? Explain. (15)

4) TransDigm Group Inc. is a leading manufacturer of highly engineered, proprietary aircraft components that are used on nearly all modern commercial and military aircraft platforms. They have financed themselves with both debt and private equity. They have €40M of senior bank debt outstanding. This is the aggregate face value of the bank debt. The bank loans have 3 years of remaining maturity. The original maturity (maturity at issue) was five years. No principal payments are due until maturity and interest payments are due at the end of each year. The next interest payment is due in one year and the coupon rate is 7%. The firm recently issued €30M of subordinated (junior) bonds outstanding. The rest of the capital structure consists of 2M shares of equity. The current risk-free rate is 4% for all maturities and the asset β is 0.82.

A) The bank loan is currently selling for €41.4M. Bank debt, like bonds, can be sold, but only among "sophisticated" investors. What rate of return will the investors receive on the bank loan if they hold to maturity and TransDigm does not default on the loan? Explain briefly. (10)

B) The junior debt that TransDigm issued last week was issued at par, has annual interest payments which are due at the end of each year (principal is paid only at maturity), and a coupon rate of 6.7%. The junior debt has a three year maturity. Given the bond and the bank loan have the same maturity; does it make sense that the bank loan has a higher interest rate (7.0% versus 6.7%). Explain? (15).

C) Draw the payoff diagram for the €30M bond issue as a function of the value of TransDigm's assets three years from today (when the bond matures). Assume that absolute priority is followed. Draw the payoff to the entire bond issue, not just one bond. Make sure you graph is clearly and completely labeled, including all critical points. (20)



D) Leverage can create an incentive for well diversified equity holders to alter the risk of the firm's assets. How would these incentives change if TransDigm had only issued the bond (no bank loan), but the total promised debt payment was unchanged? Explain briefly. (15)

Equations and Facts

Risk premiums:

$$E\left[r_{Market}-r_{risk\text{-}free}\right]=8.0\% \tag{2}$$

Payoff to Options

$$\begin{aligned}\text{Call Payoff}&=\text{Max}\left[\text{Stock price-Strike price},0\right]\\ \text{Put Payoff}&=\text{Max}\left[\text{Strike price-Stock price},0\right]\end{aligned} \tag{3}$$

Assets, Debt, and Equity Value and Cash Flows

$$\begin{aligned}\text{Asset}&=\text{Debt}+\text{Equity}\\ CF_{Asset}&=CF_{Debt}+CF_{Equity}\end{aligned} \tag{4}$$

Cash Flow to Assets:

$$\begin{aligned}\text{Cashflow}_{Assets}&=\text{Revenue}-\text{Costs}-\text{Depreciation}-\text{Taxes}\left[R-C-D\right]\\ &\quad+\text{Depreciation}-\text{Capital Expenditure}-\text{Increase in NWC}\\ &=\text{Net income}-\text{Net investment}\end{aligned} \tag{5}$$

Expected Return on Debt, Equity, and Assets

$$\begin{aligned}r_{Asset}&=r_{Debt}\frac{D}{D+E}+r_{Equity}\frac{E}{D+E}\\ r_{Equity}&=r_{Asset}+\frac{D}{E}\left(r_{Asset}-r_{Debt}\right)\\ r_{Asset}&=r_{Risk\text{-}free}+\beta_{Asset}E\left[r_{Market}-r_{Risk\text{-}free}\right]\\ r_{Debt}&=\left(1-p\right)r_{promised}+p\,r_{default}\end{aligned} \tag{6}$$

Forward Price

$$\text{Forward Price}_0=E_0\left[\text{Asset Value}_1\right]\frac{\left(1+r_{risk\text{-}free}\right)}{\left(1+r_{asset}\right)} \tag{7}$$

NPV of Project

$$\text{NPV}\left[\text{Project}\mid\text{Capital Structure is Irrelevant}\right]+\text{NPV}\left[\text{Financing}\right] \tag{8}$$

Be Greater than Average

(9)