LISBON SCHOOL OF ECONOMICS & MANAGEMENT
UNIVERSIDADE DE LISBOA

CORPORATE INVESTMENT APPRAISAL

MASTERS IN FINANCE

EXAM

10 JANUARY 2017

2 HOURS + 15 minutes

INSTRUCTIONS TO READ BEFORE STARTING ANSWERING THE QUESTIONS

1. Please fill in your name and student number.
2. The exam has 5 groups of questions, with marks clearly indicated.
3. You may use one A4 sheet of paper with notes.
4. The cumulative Normal distribution table is attached at the end.
5. You may un-staple the Normal table, and the scrap paper. Nothing else.

Good Luck!

Name_____ No. _____

PROFESSOR CLARA RAPOSO'S VIP AREA:

GROUP	GRADE	COMMENT
I (4.5 points)		
II (5 points)		
III (3 points)		
IV (4.5 points)		
V (3 points)		
TOTAL (20)		

GROUP I (4.5 points)

Prince Industries is considering investing in a machine that will cost $1,200,000 and will last for three years. The company has been studying this business opportunity for over 2 years now, and already spent $500,000 last year in a marketing study. The machine will generate revenues of $1,300,000 each year and the cost of goods sold will be 50% of sales. The project will also involve an annual fixed administrative expense of $200,000. At the end of year 3 the machine will be sold for $150,000. The annual net working capital of the project is 8% of each year's sales. The appropriate cost of capital is 10% and Prince *Industries* is in the 35% tax bracket.

(I.a) (1.25 points) Compute the annual free cash flows of the project. Show your computations.

t	0	1	2	3	4
Revenues	0	1300000	1300000	1300000	0
COGS	0	650000	650000	650000	0
Admin Expenses	0	200000	200000	200000	0
EBITDA	0	450000	450000	450000	0
Depreciation	0	400000	400000	400000	0
EBIT	0	50000	50000	50000	0
EBIT(1-Tc)	0	32500	32500	32500	0
CapEx	1200000	0	0	-97500	0
NWC	0	104000	104000	104000	0
Change in NWC	0	104000	0	0	-104000
FCFt	-1200000	328500	432500	530000	104000

(I.b) (1.25 points) Would you invest in this project? Explain.

Cost Capital	10%	
NPV	-74695,38	<0 should nor invest

(I.c) (1 point) **Without making further computations**, what can you say about the Internal Rate of Return of this project? Explain.

Since NPV>0 with a cost of capital of 10%, then the project's IRR is higher than 10%. This is necessarily true given the profile of cash flows of this project in what concerns the signs (start negative and change only once).

(I.d) (1 point) How does this project compare with an alternative machine priced at $900,000 that would generate an annual free cash flow of $600,000 for 2 years, and with a discount rate of 10%? Show your computations and explain your answer.

FCFt	-900000	600000	600000
r	10%		
NPV	141322,31	>0 so clearly better.	
		waste of time trying to assess difference in life of equipment, etc.	

GROUP II (5 points)

Consider the following financial information regarding *Dave&Bow Corporation*:

Dave&Bow Co. Market Value Balance Sheet ($ Millions) and Cost of Capital

Assets		Liabilities		Cost of Capital	
Cash	250	Debt	650	Debt	7%
Other Assets	1200	Equity	800	Equity	14%
				τ_C	35%

The company is now analyzing a new project with estimated cash flows:

Dave&Bow Co.'s New Project Free Cash Flows ($ thousands)

Year	0	1	2	3
Free Cash Flows	($250)	$75	$150	$100

Assume that this new project is of average risk for *Dave&Bow Co.* and that the firm wants to hold constant its debt to equity ratio. Currently the risk-free interest rate is 5.5% and the market risk premium is 6%.

(II.a) (1.25 points) Should *Dave&Bow Co*. invest in the new project? Explain.

D	400
E	800
D+E	1200
Rd	7%
Re	14%
Tc	35%
Rwacc	0,1085
NPV	€13,15

Because NPV>0, should invest.

(II.b) (1.25 points) *Dave&Bow Co.*'s CEO wants to reduce the financial risk of the company, in order to lower as much as possible its cost of debt. The CEO has determined that this is possible if the firm lowers its ratio of debt-to-value to 0.1. What would the value of the project be in this case? Show your computations and explain.

		Based on
Ru	0,116666667	initial data
D/(D+E)	0,1	
Rd	Rf	5,50%
Re	0,123518519	
Rwacc	0,114741667	
NPV	10,18	lower value due to lower ITS.

(II.c) (1.25 points) Assume again the target capital structure of question (II.a). *Dave&Bow Co.*'s CEO just realized that the new project diversifies its business, and it should be classified in a different line of business. For the only competitor company operating in this new industry, the CEO found the following information:

Equity Beta	Debt Beta	Debt-Equity Ratio
1.8	0.4	1.5

Does your investment decision change with this new information? Explain.

Competitor	
Re	0,1630
Rd	0,07900
Ru	0,1126

Dave&Bow		
Rd	7%	must assume something. For example assume Rd stays same
Re	0,1339	
Rwacc	0,104433333	
NPV	15,11	

NPV>0 – should not change decision to invest.

(II.d) (1.25 points) Consider again the scenario of financing of question (II.a), with the additional information that the personal tax rate on equity securities is 15% and the personal tax rate on debt securities is 20%. What is your estimate of the present value of the interest tax shield (after personal taxes) associated with the new project? Show all your computations.

Te	15%			
Ti	20%			
Annual ITS	((1-Ti)-(1-Tc)(1-Te))*Interest			
t	0	1	2	3
PVt	€263,15	€216,70	€90,21	€0,00
Dt	€87,72	€72,23	€30,07	€0,00
Interest	0	€6,14	€5,06	€2,10
Annual ITS	0	1,519682229	1,251442751	0,52097429

And then make a suggestion as to what rate to use to discount. Open to different answers.

GROUP III (3 points)

Remember the asymmetric information problem (the "*lemons*") of Myers and Majluf (1984) seen in class, regarding a company that needs to raise more equity via a seasoned equity offering.

Consider there are two scenarios for the possible value of company *Leonard&Co*: a more optimistic scenario ("High") and another more pessimistic scenario ("Low"), both with probability ½. In scenario "High" the equity of the company will be worth 300, while in scenario "Low" its value is 100. To simplify, consider a zero discount rate. The shares of the company currently have a total market capitalization of 200.

A new project arrives requiring an investment of 150, which needs to be raised in the market. Assume that asymmetric information exists, and the manager already knows in which state/scenario the company is.

(III.a) (1.5 points) Assume the new project has an NPV of 70 (in both scenarios). Under what circumstances will the equity offering take place? Show your computations and comment.

scenario	High	Low	average
prob	0,5	0,5	
Old Shareholders	300	100	200
New project:			
Investment	150	150	
NPV	70	70	
With Equity Offering:			
Total Equity	520	320	420
% new shareh	0,357142857	0,357142857	
% old shareh	0,642857143	0,642857143	
Value Old Shar	334,2857143	205,7142857	260
Value New Shareh	185,7142857	114,2857143	150

In this example the lemons problem does not occur since in both scenarios (low and high) the equity stake of the old shareholders is above what it would have been in the absence of the equity offering (i.e., 334.29>300 and 205.72>100).

(III.b) (1.5 points) For what value *X* of NPV of the new project would the *lemons* problem of underinvestment arise? Explain by showing your computations.

new value (average)	350+X
% new shareholders	150/(350+X)
% old shareholders	(200+X)/(350+X)

Old want to invest in High scenario if:

(200+X)/(350+X)*(300+150+X)>=300

and

X^2+350X-15000>=0 X>=0

Solution: X<38.6

GROUP IV (4.5 points)

Firm *GeorgMike Inc.* currently has no debt and its market capitalization is € 80,000,000 with a stock price of € 8. The annual volatility of *GeorgMike Inc.*'s assets has been estimated at 20%. The CEO has just announced a new issue of convertible bonds. 5000 bonds will be placed in the market at their nominal value, which is € 1000 per bond. The bonds promise to pay an annual coupon of 8%, with annual payments, during 2 years. Each bond may be converted into shares at maturity (in 2 years' time) for an implied exercise price of €10 per share. The risk-free interest rate is 3% (continuous compounding) and the yield-to-maturity (continuous time) of the straight bonds issued by companies similar to *GeorgMike Inc.* is 8%.

Market Cap	80000000	# bonds	5000		Rf
Price	8	par	1000	per bond	y
# shares	10000000	Face Value F	5000000		
Sigma	20%	Coupon rate	8%		
		Annual Coupon	400000		
dt	1	T	2		
		K	10		
		# new shares	500000		
		lambda	0,04762		
		F/lambda	105000000		

(IV.a) (1 point) What would be the value of the convertible bonds that *GeorgMike Inc.* is issuing, if these bonds were "simple", without the conversion feature? Show all your computations.

t	0	1	2
cash flows		400000	5400000
Price simple bond	4970822,999		

(IV.b) (2 points) Considering the Black-Scholes model, what is the value of the convertible bonds issue at the time of its announcement? Explain your assumptions and show your computations.

warrant component = lambda*call

call on underlying assets including the money raised with the convertible bonds isse, but taking into account that money leaves when coupons are paid

t	0	1	2
coupons		400000	400000
PV (coupons)	710104,0541		

d1	-0,423197577
d2	-0,70604029
N(d1)	0,336075557
N(d2)	0,240081541

Call	4587244,268			
Warrant	218440,2032			
Convertible Bonds		5189263,202	>facevalue	5000000

(IV.c) (1.5 points) What is your estimate of the value of the shares of *GeorgMike Inc.* after the convertible bonds are issued? Explain.

Price 7,98107368

Under all the usual assumptions (zero NPV, etc)

GROUP V (3 points)

In the framework of Merton's model, consider the following data of company LostMUSIC: Equity has a market cap of 9.6 and a volatility of 60.5%. In 2 semesters' time, a loan of 250 reaches its maturity (ignore intermediate cash flows). Additionally, we know that the risk-free interest rate is 2% per year (continuous time).
You are told that the value of LostMUSIC's Assets follows a binomial model, for which we were given the following information:

TODAY	Semester 1	Semester 2
255	258.0736056	261.1842585
	251.9630004	255
		248.9621709

u	1,012053351	dt	0,5
d	0,988090202		
Rf	2%		
p	0,916405642		
Asset vol	0,0169441		

(V.a) (2 points) Is it credible to you that the Tree for the Value of the Assets of company LostMUSIC is the one in the previous table? Show your computations and explain your answer.

Equity	TODAY	Semester 1	Semester 2
	9,95744042	10,56114611	11,18425633
		4,53643627	5
			0

Stock price not too far from 9.6 maybe credible, maybe not…

Implied Vol	0,427821918	not credible.

(V.b) (1 point) **For this question, assume that the tree given above for the assets is correct and that there is a fixed bankruptcy cost K when (and if) liquidation takes place.** If you are told that the market value of the bonds of LostMUSIC is 244 today (t=0), what would your estimate of the fixed bankruptcy cost, K, be?

Debt	TODAY	Semester 1	Semester 2
	244	247,5124584	250
		X	250
			248,962173-K

244=e^(-2%*0.5)*(p*247.5124584+(1-p)X)

X=	234,8295729

247.5124584=e^(-2%*0.5)*(p*250+(1-p)(248.962173-K))

K=	152,2063755