FUNDING INVESTMENTS
FINANCE 238/738, D. Musto
SECOND TEST
80 MINUTES / 80 POINTS

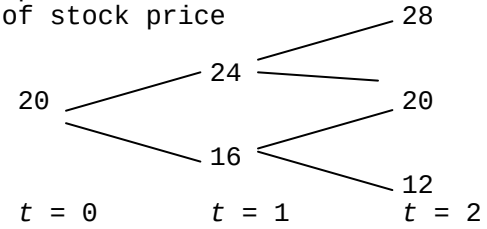
Your Name: _____

Section you are registered for: _____

1. A stock trades for 20 today. In one year it will be either 16 or 24, each with probability ½. If it goes to 16 then the next year it will be either 12 or 20, and if it goes to 24 then the next year it will be either 20 or 28. The one-year interest rate is 5% (and it will be 5% next year too).
   a. (5 pts) How much is the option to buy the stock for 18 in two years worth today?
   b. (5 pts) If you replicate the payoff of this option by trading the stock and the bond, how many shares will you buy or sell in one year if the stock goes to 16? (that is, how will the number of shares you own *change* at that point?)

(a) 2-period call with strike X = 18, r = 1.05

Path of stock price



At $t = 1$:

Top Branch: $C_{uu} = 10$, $C_{ud} = 2$

$$n = \frac{C_{up} - C_{down}}{S_{up} - S_{down}} = \frac{10-2}{28-20} = 1$$

$$B \quad \frac{1}{1 \quad r_F} \quad \frac{C_{down}S_{up} \quad C_{up}S_{down}}{S_{up} \quad S_{down}} \quad \frac{1}{1.05} \quad \frac{2(28) \quad 10(20)}{28 \quad 20} \quad 17.14291$$

$C_u = nS+B = 1(24) - 17.1429 = 6.8571$

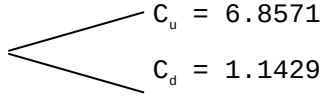
Bottom Branch: $C_{du} = 2$, $C_{dd} = 0$

$$n \quad \frac{2 \quad 0}{20 \quad 12} \quad 0.25$$

$$B \quad \frac{1}{1.05} \quad \frac{0(20) \quad 2(12)}{20 \quad 12} \quad 2.8571$$

$C_d = 0.25(16) - 2.8571 = 1.1429$

At $t = 0$:



$$n \quad \frac{6.8571 \quad 1.1429}{24 \quad 16} \quad 0.7143$$

$$B \quad \frac{1}{1.05} \quad \frac{1.1429(24) \quad 6.8571(16)}{24 \quad 16} \quad 9.7957$$

Value of Call: C = $nS + B$ = (0.7143)20 – 9.7957 = **4.49**

(b)
At year 0, you buy 0.7143 shares to replicate the portfolio. If the stock goes down to 16 at year 1, you need 0.25. Therefore you need to sell 0.4643 (= 0.7143 – 0.25) shares.

2. On Thursday April 10, 2003, the on-the-run 5-year note, which pays a 3% coupon and matures 2/15/08, was quoted at 100 21/32 bid, 100 22/32 asked (4/10/03 is 127 days before 8/15/03, and 54 days after 2/15/03).
   a. (5 pts) What would be the invoice price to purchase $7.5MM principal amount of this note?
   b. (5 pts) The general collateral repo rate was 1.25% and this note had a specialness of 60bp. If the repo market required 2% margin (i.e. collateral = 102% of loan amount), how much of the purchase price could you have borrowed in the repo market, and how much interest would you have paid for a one-day loan?

(a)(5 points)
Ask Price – 100 + 22/32 = 100.6875
Accrued Interest – 54 / (54 + 127) = .2983 * (3.00%/2) = .4475

Invoice price is 100.6875 + .4475 = 101.1350
You would then purchase $7.5 MM * 101.1350 = $7.5851 MM of bonds

(b) (5 points)

General repo rate – 1.25%
Specialness - .60% or 60 basis points

New repo rate – 1.25% - .60% = .65%

Amount that can be borrowed = $7.5851 MM / 1.02 = $7.4364 MM

Interest you would have paid = $7.4364 MM * (1 / 360) * (.65%) = $134.27

3. (10pts) Some fund families want to use "fair value pricing" for their funds. Under fair value pricing, funds do not calculate their net asset values from the last trades of the stocks they hold. Instead, funds calculate their net asset values from the prices at which they estimate their stocks *would have* traded at 4PM. In making this estimate, they consider how the market moved since a stock's last trade. What type of mutual-fund investor would fair value pricing help?

Investors that would benefit the most are long-term investors in small-cap (or otherwise illiquid stock) funds. These investors are currently getting diluted by people buying at the end of the day if the market went up or shorting if it went down.

4. The corporate income tax rate is 35%. Suppose that the corporate dividends-received deduction is 80% next year, and suppose also that the commercial paper (CP) rate is 3% next year.
   a. (5 pts) Suppose a corporate *investor*, whose marginal income-tax rate is the full 35% and currently invests in CP, views money-market preferred (MMP) and CP to be equivalent except for the tax treatment. What dividend yield on MMP would make him indifferent between CP and MMP?
   b. (5 pts) Consider a corporate *issuer*, whose marginal income-tax rate is 25% and who currently issues CP. Could the issuer benefit from selling MMP instead? (*don't worry about underwriting costs here*)

(a) Dividend yield that would make the investor indifferent would be when post tax interest from CP equals post tax income on MMP:

Marginal income tax for investor – 35%
Equivalent MMP yield = x%

.03*(1-0.35) = x * (1-0.2*0.35)
x= 2.0968%

(b) Again, from the issuer's perspective, he would be indifferent if post tax cost of CP equals dividend yield on MMP.
Post tax cost of CP = .03*(1-.25) = 2.25%
The issuer will be indifferent if the yield on MMP is 2.25% and would prefer any dividend yield below 2.25%.
Since the investors are indifferent at a yield of 2.1%, a dividend yield between 2.1% and 2.25% would be preferable to both parties.

5. You are a making a market for eToys stock, so you post a bid and an ask at which you will honor the next order to sell or buy 1 share. eToys will announce its earnings tomorrow, and everybody knows that eToys will be worth 150 if earnings are bad, and 140 if earnings are even worse. From what you know, these outcomes are equally likely. The next order has a 10% chance of coming from an insider, and 90% chance of coming from a Day Trader. Insiders *know* for sure what the stock will be worth tomorrow, and Day Traders *think* they know for sure but *you* know that they are right only 60% of the time.

a. (4 pts) What is the expected value of 1 share, given that a Day Trader makes a buy order?
b. (4 pts) What is the ask price at which you, the market maker, break even?
c. (4 pts) Is day trading profitable or not? Explain.

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(a) E(V) if buy order from day trader = .6*150 + .4*140 = 146

(b) Break-even ask price = 'A'
If buy order comes in, to break even:
0.1*(A-150) + .9*(A-146) = 0
A= 146.4
Note: If buy order comes in from a day trader, E(V) = 146.

(c) Market maker makes losses while trading with insiders and recovers
them by trading with mis-informed day traders.  Consequently, day
trading is not profitable on average.  In the above example, the Ask
price is 146.4 for day traders, while expected value of stock is 146.
Therefore, on average day traders will lose money.
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6. Toyota wants to securitize its dealer loans by setting up a trust that will issue bonds to the public and invest the proceeds in dealer loans. The trust will buy the loans at a preset discount of *d*%, and when dealers pay off the loans as cars are sold, the proceeds go to the trust. So for example, if *d* is 3 then when a dealer borrows $30,000 to buy a car from Toyota, then the trust buys that loan for $29,100, and the dealer pays the trust $30,000 when it sells the car. Dealers take 4 months to sell a car, after purchasing it from Toyota. 1% of all dealer loans default, and when a loan defaults the trust can recover half of the loan value by repossessing the car and selling it. Servicing dealer loans costs 1% per year.
a. (4 pts) How, very briefly (and without any calculations), can the trust issue 5-year bonds backed by these loans?
b. (6 pts) The coupon rate on the bonds will be 5%. Can the trust cover its expenses if *d* is 3?

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a) The trust can use a soft bullet structure similar to that used with
credit card receivables. This involves having a revolving period where
principal coming into the trust is used to reinvest in new loans to the
car dealers, and an accumulation period closer to maturity of the 5-yr
bond where the principal is accumulated in order to pay the bond off in
full.

b) Number of times a loan is made = 12 months a year/ 4 months to sell a
car = 3
Gross annual income = 3% * 3 = 9%
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Net annual default = (1 - 0.5%) *3 = 1.5%
Servicing cost = 1%
Coupon = 5%
Net income = 9% - 1.5% - 1% - 5% = 1.5%

Therefore the trust can cover its expenses.

7. (10 pts) The Green Shoe Option is practically always 15% of the offering size, but underwriters sometimes initially oversell the offering by more than 15% of the offering size. If an underwriter initially oversells by much more than 15%, what does the underwriter probably suspect about how the offering will play out? Explain.

The bank is forecasting a cold offering. This is clear as it has a short position on the stock, one they will need to cover by buying back shares on the open market (they sold more than Green Shoe).

8. (8 pts) "Reorganization plans are not explicitly required to follow absolute priority, but they do anyhow because creditors must get at least what they would get in Chapter 7, where absolute priority is followed." Discuss the elements of this argument carefully, and support your argument with a simple numerical example.

Elements of the argument should point out the following:

a) Companies are typically worth more as a "going concern" so it is beneficial for all involved (creditors and equity holders) to agree to a reorganization plan rather than force the company into Chapter 7
b) Most reorganizations do not follow absolute priority since they are designed to get each creditor class to "buy-in" to the plan so many companies will try and seek concessions from the senior debt classes so that the assets are distributed among all the creditor classes (clearly with a weighting towards the senior debtholders).
c) It is true that all classes have to get at least what they would have received under a Chapter 7 liquidation in any reorganization plan.

Numerical example:

	Current Situation	Chapter 7	Reorganization Plan
Company Value		$50 MM	$100 MM
Senior Debt	$75 MM	$50 MM	$65 MM
Subordinated Debt	$50 MM	-	$30 MM
Equity Value	$50 MM	-	$5 MM