Your name: format family name, comma, personal name(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Your student ID: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**UNIVERSITY OF TORONTO**

**Faculty of Arts and Science**

#### JUNE 2008 EXAMINATIONS

#### ACT240H1F

**Duration – 2 Hours**

Aids: All calculators allowed

Instructor: Keith Sharp PhD FSA CFA

NOTES:

1. Calculators allowed
2. It’s OK to write on book.
3. This is a closed book exam.
4. Multiple choice: only your letter answer mark sense sheet will be graded.
5. Each question: 10 points correct, two if blank, zero points if wrong
6. So expectation if you guess is the same as leaving a blank.
7. Make sure you’ve indicated your letter answers on the mark sense sheet before time’s up
8. Please stay in your seats and don’t talk till all question papers and mark sense sheets (and scrap, if used) have been collected.
9. Photo ID on desk during exam please.
10. Name and student ID on this question paper and on mark sense sheet please.
11. Please code question 25 with the privacy code (A, B, C or D) in the page footer.
12. Good luck!

|  |
| --- |
| (000000 01-029 ;Sharp401610241041v02) *(Assignment for May 15, 2008)* You want to have $10,000 in your bank account five years from now. The bank expresses its savings accumulation rate as ‘annual discount rate of d=2.75% per annum’. How much (the ‘present value’ of $10,000) do you need to deposit in the account today?   (A) Less than $8,500.000 (B) $8,500.000 but less than $8,600.000 (C) $8,600.000 but less than $8,700.000 (D) $8,700.000 but less than $8,800.000 (E) $8,800.000 or more  (*C) Solution:  PV =10,000 \* (1-d)5  PV= 10,000 \* (1-0.0275)5 =$ 8,698.57* |
| (000000 01-031 ;Sharp401610401646v02) *(Assignment for May 22, 2008)* You buy a US Treasury bill 34 days before its maturity at 100. The ‘discount rate’ is quoted as 4.124% per annum. Calculate the price paid.  (A) Less than $99.5975 (B) $99.5975 but less than $99.5980 (C) $99.5980 but less than $99.5985 (D) $99.5985 but less than $99.5990 (E) $99.5990 or more  (E) Solution:  For T-bills, US (“Discounted Dates of America”?) uses simple discount and 360 days per year.  Price per 100 = 100\*(1-(34/360)\*0.04124)  = $99.6105 |
| (000000 01-037 ;Sharp401610300947v02) *(Assignment for May 20, 2008)* The force of interest per year at time t years is given by  δ(t)= 0.015 (1+ 0.1t2)  You invest $10,000 at time t=0. Calculate your account balance at time t=3.  (A) Less than $10,350.000 (B) $10,350.000 but less than $10,450.000 (C) $10,450.000 but less than $10,550.000 (D) $10,550.000 but less than $10,650.000 (E) $10.650.000 or more  (*D) Solution:  d/dt A(t) = A(t) δ(t)  d/dt ln (A(t)) = δ(t)  A(T) = A(0)exp{ }  = 10,000 \* exp{ 0.015 [t + 0.1t3/3] 0 3 }  = 10,000 \* exp{ 0.015 [3 + 0.1\*9] }  = 10,602.45* |
| *(000000 01-038; FMman08-PS03-Q12-v02 ;B40FinF07av2.9pb0.5-B40F07TT1)* At a force of interest δt =1/(k+2t)(i) a deposit of 75 at time t = 0 will accumulate to X at time t = 3; and  (ii) the present value at time t = 3 of a deposit of 150 at time t = 5 is also equal to X.   Calculate X.   (A) Less than 123.0000 (B) 123.0000 but less than 124.0000 (C) 124.0000 but less than 125.0000 (D) 125.0000 but less than 126.0000 (E) 126.0000 or more  *(D) Solution:  X=75exp [  = 75exp[0.5 ln((k+6)/k]   = 75 [(k+6)/k]0.5  Also  X=150exp [  = 150 exp[0.5 ln(k+6)/(k+10)]  =150 [(k+6)/(k+10)]0.5  Equating  (k+10)/k=4; hence k=10/3 Hence   X= 75 [(k+6)/k]0.5 = 75\*[28/10]0.5=125.499* |
| (000000 01-041 ;Sharp1214020002 ;Sum06TT1)You want to buy a new car, the list price of which is $30,000 now but inflates at 3% effective per annum. The sticker price is changed frequently to reflect the price increases. You have $29,000 in a bank which pays interest at 7% per annum effective. You pay income tax at a rate of 40% on the interest income. How many years do you wait to get your car?  (A) Less than 2.7000 years (B) 2.7000 years but less than 2.8000 years (C) 2.8000 years but less than 2.9000 years (D) 2.9000 years but less than 3.0000 years (E) 3.0000 years or more  *(D): Solution  After-tax interest rate = 7%\*(1-0.40) = 4.2% Annual real increase in savings after inflation = 1.042/1.03 = 1.01165 (1.165% real rate after tax) t years to get your car:  (1.042.1.03)t = 30,000/29,000   Use your calculator or take logs: t = 2.9268  (Maybe better to skip the mag wheels and get the car now!)* |
| (000000 02-082 ;Brov3-Ex. 2.1.34Modified;Sum06Fin). *(Tutorial May 22, 2008)* A loan of 11,000 is made with interest at a nominal rate of 12% compounded monthly. The loan is to be repaid by 36 monthly payments of 367.21 over 37 months, starting one month after the loan is made, there being a payment at the end of every month but one. At the end of which month is the missing payments?   (A) 21 (B) 22 (C) 23 (D) 24 (E) The correct answer is not given by (A), (B), (C) or (D)  (*E)Solution   Let the missing payment be at m months  11,000 = 367.21 (a37⎤* - *1.01m)  11,000/367.21 = (30.79951*- *1.01m)  M=17* |
| (000000 02-082 ;Sharp401610400748v04) (Question of class June 5, 2008) You aim to work w=35 years from age 25 to 60 and then to draw pension for p=30 years till age 90. You wish to have the same living standard after retirement (no need to save) as before retirement (when you live on pay minus the retirement savings rate). For simplicity, model pay and pension as being paid annually at the end of each year. The real (after price inflation) rate of interest, after any taxes, is *i real*= 1.5% per annum. For the pre-retirement accumulation, you assume that the rate of interest (after pay inflation) is *i rel to pay*= 0.5% per annum. Calculate as a percentage the proportion of your pay *ZPROP* that you need to save annually before retirement. Hint: easiest to take an equation of value at the time of retirement; accumulated savings=present value of pension. Notice that the pay rate cancels from the calculation.  (A) Less than 35.000% (B) 35.000% but less than 36.000% (C) 36.000% but less than 37.000% (D) 37.000% but less than 38.000% (E) 38.000% or more  *(E) Solution:  Accumulated savings at retirement = present value of pension at retirement,   If you wish to use actuarial notation this is:  ZPROP sw⎤ (at irel to pay)= (1-ZPROP) ap⎤ (at ireal)   which is the equation of value at retirement (having divided by retirement age pay rate). Or just using geometric series  ZPROP { (1+irel to pay) w-1 + (1+irel to pay) w-2 + ………+ (1+irel to pay)1 + 1} =   (1-ZPROP) { (1+ireal) -1 + (1+ireal) -2 + ………+ (1+ireal)-p+1+(1+ireal)-p  }  Sum the geometric series or use the formulas for sw⎤ and ap⎤ (w=35, p=30, ireal =0.015, irel to pay =0.005) ZPROP { (1+irel to pay) w - 1} / irel to pay = (1-ZPROP) { 1- (1+ireal)-p  }/ireal ZPROP \* 38.145378= (1-ZPROP) \*24.0158  ZPROP(w=35, p=30, ireal =0.015, irel to pay =0.005) = 38.635%* |
| (000000 02-086 ;B40F07Fin ;Sharp401424061217v03) *(Tutorial June 12, 2008)* You can buy a $22,000 Hyundai at their ‘special’ (looks good in an ad) interest rate of 3% per annum convertible monthly on a 36 month loan repayment schedule. GM is using 1.5% per annum on their $22,000 cars, on a 48 month repayment schedule. In reality market interest rates are 12% per annum convertible monthly, which you use to calculate present values as of today. Calculate the absolute value (modulus) of the amount by which one present value exceeds the other one.   (A) Less than $1,200.000 (B) $1,200.000 but less than $1,250.000 (C) $1,250.000 but less than $1,300.000 (D) $1,300.000 but less than $1,350.000 (E) $1,350.000 or more   (D) Solution:  KHYUNDAI = 22,000/ a36⎤ (at 0.0025 per month) = 639.786  KGM= 22,000/ a48⎤ (at 0.00125 per month) = 472.51  PVHYUNDAI = KHYUNDAI a36⎤ (at 0.01 per month) = 19,262.37  PVGM = KGM a48⎤ (at 0.01 per month) = 17,942.97  Difference= 1319.49 |
| (000000 02-107 ;FMman07-Example38-SOAv00 ;B40F07TT2 ) Nikita takes out a 10-year loan. The loan is repaid by making 10 annual repayments at the end of each year. The first loan repayment is equal to X, with each subsequent repayment 10.16% greater than the previous year's repayment. The annual effective rate being charged on the loan is 8%. The amount of interest repaid during the first year is equal to 892.20. Calculate X.  (A) Less than 950.00 (B) 950.00 but less than 1050.00 (C) 1050.00 but less than 1150.00 (D) 1150.00 but less than 1250.00 (E) 1250.00 or more  ***(C) Solution:*** *The loan payments form a 10 payment annuity-immediate whose payments follow a geometric progression, with first payment X, geometric factor r=0.1016, and interest rate i=0.08 (the payment period, geometric growth period and interest period coincide). Suppose that the loan amount is L. The equation of value for the loan is  L= X {(1 – (1.1016/1.08)10)/(0.08-0.1016)] = 10.1386X  We are also given that the interest paid in the first year (first payment) is 892.20, so that I1  = OB0 i = L i = (10.1386X)(0.08) =892.20  We can now solve for X; X=1100* |
| *(000000 02-111 ;FMmanF08-PS07-Q03-v02-SOA ;239S08TT2av5.7c0.7) (Assignment for tutorial June 3, 2008)* On January 1 of each year, Company ABC declares a dividend to be paid quarterly on its common shares. Currently, 2 per share is paid at the end of each calendar quarter. Future dividends are expected to increase at the rate of r=6% per year, with the increase occurring once per year. On January 1 of this year, an investor purchased some shares at X per share, to yield 12% convertible quarterly. Calculate X.   (A) Less than $127.000 (B) $127.000 but less than $128.000 (C) $128.000 but less than $129.000 (D) $129.000 but less than $130.000  (E) $130.000 or more  *(B) Solution  4 payments of Y each at the end of each quarter is equivalent to Y s4⎤ (at 3%) at the end of each year.*  *X = 2 s4⎤ (at 3%) [ (1.03)-4  + (1+r) (1.03)-8  + (1+r)2 (1.03)-12 + ……..) =  2 s4⎤ (at 3%) (1.03)-4  1/[1-(1+r) (1.03)-4 ]   = 2 s4⎤ (at 3%) /[(1.03)4  - (1+r)] (r=0.06)  = 2\*4.183627 \* 15.26512  = 127.727* |
| (000000 03-171 ;Sharp401612301420v00) Local car dealers are making the following offers on three models of car:   |  |  |  |  | | --- | --- | --- | --- | |  | ***Avenger*** | ***Bankrupter*** | ***Crasher*** | | *Price* | 35,000 | 31,000 | 39,000 | | *Down payment* | 3,000 | 2,500 | 3,500 | | *Interest rate on loan for balance* | 6% per year compounded monthly | 9% per year compounded monthly | 15% per year compounded monthly |   In each case the car loan, if taken in preference to paying the ‘price’ as a lump sum, would be for 48 months with level dollar payments at the end of each month. Your bank manager is willing to lend you however much money you want at 12% per year compounded monthly, which is also the rate at which you calculate present values. You decide to buy all three cars, A, B and C, and to arrange the method of paying for the cars so as to minimize the present value of your total outlays. Calculate that minimum present value.  (A) Less than $99,000.00 (B) $99,000.00 but less than $101,000.00 (C) $101,000.00 but less than $103,000.00 (D) $103,000.00 but less than $105,000.00 (E) $105,000.00 or more  *(B) Solution  Borrow from the bank for the Crasher, so it has PV of 39,000. Use the loans for A and B.  PV(A)= 3000 + (35000-3000) a48⎤ (at 1%) /a48⎤ (at 0.5%)   =3,000 + (35000-3000) \* 37.974/42.580  = 31,538  PV(B)= 2500 + (31000-2500) a48⎤ (at 0.75%) /a48⎤ (at 0.5%)   = 2500 + (31000-2500) \* 40.185/42.580  = 29,397  PV(C)=39,000  PV(A+B+C) = 99,934* |
| *(000000 03-177; B40F07TT2 Sharp40142202030v02)* You are buying λ/2 Actuarial Road, Scarborough, paying $460,000. You are paying $40,000 cash and borrowing the rest from ScotiaBank at their 5.7% per annum (compounded semi-annually) rate for a three-year mortgage. Amortization uses a 25 years period and mortgage payments are made at the end of each month. Calculate the monthly payment.(A) Less than $2,650.00 (B) $2,650.00 but less than $2,700.00 (C) $2,700.00 but less than $2,750.00 (D) $2,750.00 but less than $2,800.00 (E) $2,800.00 or more  *(A)Solution:*  *(1+j(12)/12)12 = (1+j(2)/2)2 = (1+0.057/2)2 j(12)/12 = 0.004694557  For first three years we pay monthly:  K= (460,000-40,000)/ a 300⎤  (atj(12)/12 = 0.004694557)   = $2,612.75 per month* |
| *(000000 03-183 ;FMmanF08-PS09-Q04v02-SOA) (June 5, 2008 tutorial)* Jeff obtains a mortgage loan of 55,000 to be repaid with monthly payments at the end of each month for n years. Each monthly payment is 521.56, based on a nominal annual interest rate of i compounded monthly (i>0). Jeff is unable to make the first payment but makes all the other payments on time. Still, because he skipped the first payment, he owes 3,077.94 at the end of n years. Calculate i.   (A) Less than 9.2000% (B) 9.2000% but less than 9.3000% (C) 9.3000% but less than 9.4000% (D) 9.4000% but less than 9.5000% (E) 9.5000% or more  *(D) Solution  v and j are per month  v12n-1 = 521.56/3077.94  55,000 = 521.56 [1 – v12n ]/j  =521.56 [ 1 – (521.56/3077.94)v]/j  Multiply by j(1+j)   55000 j (1+j) = 521.56 (1+j) - (521.562/3077.94)  55000 j 2  + j [ 55,000 – 521.56] + (521.56 )2 /3077.94 -521.56 = 0   j = { - [ 55,000 – 521.56] ± sqrt ([ 55,000 – 521.56] 2 – 4\*55,000\*(521.562/3077.94-521.56)}   / (2\*55000)  = - [ 55,000 – 521.56] ± 55,346.19}    / (2\*55000)  = 0.007889 (taking positive solution)*  *i = 12j = 0.09466* |
| (000000 03-185 ;Sharp401612301455v00) You are buying a $500,000 house in the United States, using a down payment of $20, 000 and, for the balance, an option adjustable rate mortgage (Option ARM, use the description in this question). Under this mortgage, for the first 120 months the interest rate on the debt is 6% per year, compounded monthly. You are allowed to make monthly payments which you can choose from month to month, but at least $1,200 per month. However, if and when the outstanding principal (the loan balance) exceeds 115% of the principal at house purchase, then the required payment `pops up` to a higher amount at which you make positive principal payments monthly. Calculate how many months after house purchase the pop-up pops up.   (A) Less than 50.000 (B) 50.000 but less than 55.000 (C) 55.000 but less than 60.000 (D) 60.000 but less than 65.000 (E) 65.000 or more  *(B) Solution  OBt/12 = (500,000-20,000)\*1.005t - 1200 st⎤  At the 115% point,*  *1.15 = 1.005t - 0.0025 st⎤ 1.15 = 1.005t  - 0.0025 (1.005t -1)/0.005  0.5\* (1.005t -1) + 1.15 = 1.005t   1.005t = 1.3  t=ln(1.3)/ln(1.005) = 52.6 months* |
| (000000 03-190 ;Sharp401612301555v00) All interest rates are effective. You borrow $20,000 from your uncle, paying him 5% interest at the end of each year. You want to repay this loan after 10 years through use of two sinking funds. Half the debt will be repaid using a sinking fund of end-of-year deposits to blue bank, which pays 4% interest. The other half of the debt will be repaid using a sinking fund of end-of-year deposits to red bank, which pays 3% interest. If you win the sports tournament then your uncle will let you instead repay him with 10 level end-of-year amortization payments (‘blended principal and interest’) at 5%. Using the 5% rate for your discounting, calculate the value to you of winning the sports tournament.  (A) Less than $2,500.000 (B) $2,500.000 but less than $2,600.000 (C) $2,600.000 but less than $2,700.000 (D) $2,700.000 but less than $2,800.000 (E) $2,800.000 or more  *(A) Solution  There would be no difference if the two banks both used 5%. So relative to that,  Diff in PV= a10⎤ (at 5%) \*10,000\* [ 1/ s 10⎤ (at 3%)+ 1/ s 10⎤ (at 4%) -2 /s 10⎤ (at 5%) ]    = 7.72173\* [1/11.46388 + 1/12.00611 -2/12.57790] \*10,000  = 900.704* |
| *(000000 03-190;Sharp1222120002v00 ;BF06TT2)* At January 1, 2008 you borrowed $1,000,000 from Blue Bank to buy a flourishing ‘rent-a-nerd’ business. You agree to pay to Blue Bank 8% p.a. effective interest annually, with the first payment on December 31, 2008 and the last payment on December 31, 2027, the day of loan repayment to Blue Bank. Under a sinking fund arrangement, you make level payments December 31, 2008 through December 31, 2027 to Red Bank, using an interest rate of 9% per annum effective.  Just after the 11th payment, Blue Bank announces that to foster good customer relations, it will now charge only 7% per annum. For your internal business purposes you use an interest rate of 10% per annum effective in calculating present values. You tell Blue Bank, using this basis, that you would be just as happy to continue to pay at the 8% rate but to receive a lump sum X from Blue Bank instead of the reduction. The lump sum would be paid just after the 11th. annual payment. Calculate X.   (A) Less than $55,000.000 (B) $55,000.000 but less than $56,000.000 (C) $57,000.000 but less than $58,000.000 (D) $58,000.000 but less than $59,000.000 (E) $59,000.000 or more  *(C) Solution:  Last nine payments to Blue Bank are reduced from 0.08\*1,000,000 to 0.07\*1,000,000  Value of this reduction at 10% = X = (80,000-70,000)\*a9 0.10 = 10,000 \* 5.75902=57,590* |
| *(000000 04-228 ;Sharp401612280363v00) (Question of class June 12, 2008)* You are given the following information about a bond purchased just after a coupon is paid:  Calculate the redemption (maturity) value C.  (A) Less than $102.0000 (B) $102.0000 but less than $104.0000 (C) $104.0000 but less than $106.0000 (D) $106.0000 but less than $108.0000 (E) $108.0000 or more    *(D) Solution*   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | Annuity factor at j per $1 coupon | | *ank* | 8.98259 | | Hence value of coupons | |  | *rF ank* | 44.91292503 | | Plus value of maturity | |  | C (1+j)^(-n) | 87.3171 | |  |  |  |  |  | | Redemption value |  |  |  | 106.4390 | |
| *(000000 04-228 ;Sharp401612280903v00) (Question of class June 10, 2008)* You are given the following information about a bond purchased just after a coupon is paid:  Calculate the purchase price  (A) Less than $10,200.00 (B) $10,200.00 but less than $10,400.00 (C) $10,400.00 but less than $10,600.00 (D) $10,600.00 but less than $10,800.00 (E) $10,800.00 or more    *(C) Solution*   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | *Price at purchase:* |  |  |  |  |  | |  |  |  |  |  |  | |  | *Annuity factor at j per $1 coupon* | | *ank* | *10.57534* |  | | *Hence value of coupons* | |  | *rF ank* | *2643.835305* |  | | *Plus value of maturity* | |  | *C (1+j)^(-n)* | *7,884.9318* |  | | *Purchase price P=ABV(0)* | |  | *Sum of two* | *10,528.7671* |  | | *Premium Prem0 at purchase* | |  | *P-F* | *528.7671* |  | |  |  |  |  |  |  | | *Or Prem0=value of 'excess' coupons* | |  | *(rF-jC) ank* | *528.7671* |  | |
| (000000 04-229 ;Sharp401612301103v00) A bond matures at $100 par at time t=20 years and pays coupons twice per year. A time 0 change in market interest rates from 4% p.a. effective to 5% p.a. effective reduces the bond market price by $20.34. Calculate the annual coupon rate.  (A) Less than 11.000% (B) 11.000% but less than 12.000% (C) 12.000% but less than 13.000% (D) 13.000% but less than 14.000% (E) 14.000% or more  (*B) Solution:  20.34 = 100 (1.04-20 – 1.05-20) + 100\*r (a40⎤ (at (1.040.5 -1)) - a40⎤ (at (1.050.5 -1))   20.34 = 100 (1.04-20 – 1.05-20) + 100\*r (a40⎤ (at (1.040.5 -1)) - a40⎤ (at (1.050.5 -1))   20.34 = 7.950 + 100\*r (27.450 – 25.232)  2r=0.1117* |
| (000000 04-246 ;FMmanF08-PS12Q07-v02 ;Sum07Fin) *(Tutorial June 17, 2008)* A 5,000 par value 18-year bond with annual coupons is bought to yield an annual effective rate of 5%. The amount for amortization of premium in the 10-th year is 20. The book value of the bond at the end of year 10 is X. Calculate X to the nearest $10  (A) 5180  (B) 5200  (C) 5220  (D) 5240  (E) The correct answer is not given by (A), (B), (C) or (D)  *(B) Solution  Premium amortized in coupons 11-18   = 20 (1.05 + 1.052 +….+ 1.058)  = 20 \* 10.027  = 200.53  Hence, since final BV=5000, ABV10 = 5200.53* |
| *(000000 04-246; FMmanF06-PS12Q01-SOA-v02 ;F06Fin)* Five years ago, the XYZ company bought a 20 year 100,000 bond with coupons at 10% per year paid twice per year. The next coupon is due 6 months from today. You are given:  (i) The bond was bought to yield 7%, compounded semi-annually. (ii) The market value is based on a 6% interest rate, compounded semi-annually.  Calculate the unrealized capital gain (the excess of market value over book value) to the nearest $100.   (A) $11,600  (B) $11,900 (C) $12,200 (D) $12,500 (E) The correct answer is not given by (A), (B), (C) or (D)  *(A) Solution:  BV10/2=PV 0.035  ( $5,000 coupons plus $100,000 maturity)   = 5000 a 0.035 30 + 100,000/1.03530 = 91,960.22 + 35,627.84  =127,588.65*  *MV10/2 = PV 0.03  ( $5,000 coupons plus $100,000 maturity)   = 5000 a 0.03 30 + 100,000/1.0330 = 98,002.21 + 41,198.67  = 139,200.88  Unrealized capital gain = MV-BV=139200.88-127,588.65=$11,612.23* |
| *(000000 05-272 ;Sharp121220600004 ;F06Fin)* As a special promotional offer, NBMA lets people borrow $2,000 on a credit card, with only interest payments at the end of every month required till the person pays off the full outstanding debt after five years. NBMA charges its usual rate of 18% per annum compounded monthly.  NBMA uses a rate of 6.5% per annum effective in calculating the net present value of its projects. It costs $9 to have a telemarketer talk to a person. What percentage of telephoned people needs to accept NBMA’s offer to ensure that NBMA breaks even?  (A) Less than 1.000% (B) 1.000% but less than 1.500% (C) 1.500% but less than 2.000% (D) 2.000% but less than 2.500% (E) 2.500% or more  (*A) Solution:   First calculate the NPV at 6.5% of one successful (and repaid) loan:  1.0651/12-1 = 0.005261694 = j  NPV = -2,000 + 2,000 \* (0.18/12 \* aj 60 + 1/1.0655)   = 2,000 (-1+0.770054 + 0.729881)  = $999.87  Hence at $9 per try, the necessary success rate is 9/999.87= 0.00900=0.9%* |
| *(000000 05-280 ;FMmanF08-PS13Q03-v02-SOA) (Tutorial June 19, 2008)* On January 1, 1999 Luciano deposits 90 into an investment account. On April 1, 1999, when the amount in Luciano's account is equal to X, a withdrawal of W is made. No further deposits or withdrawals are made to Luciano's account for the remainder of the year. On December 31, 1999, the amount in Luciano's account is 83. The dollar-weighted return over the 1-year period is 20%. The time-weighted return over the 1-year period is 18%. Calculate X.  (A) Less than 101.000 (B) 101.000 but less than 103.000 (C) 103.000 but less than 105.000  (D) 105.000 but less than 107.000 (E) 107.000 or more  *(A) Solution  Dollar weighted:  90 \* 1.20 – W \* 1.200.75 =83  Hence W = 21.80  Time weighted:  (X/90) \* 83/(X-21.80) = 1.18  83/(90\*1.18) = 1 – 21.80/X  X=99.791* |
| *(000000 05-280; SoA-C2-Nov2000-Q27v02) (Question of class June 17, 2008)* An investor deposits 50 in an investment account on January 1. The following summarizes the activity in the account during the year:   |  |  |  | | --- | --- | --- | | *Date* | *Value Immediately Before Deposit* | *Deposit* | | March 15 | 40 | 20 | | June 1 | 80 | 80 | | October 1 | 175 | 75 |   On June 30, the value of the account is $162.50. On December 31, the value of the account is X. using the time-weighted method, the equivalent annual effective yield during the first 6 months is equal to the (time-weighted) annual effective yield during the entire 1-year period.  Calculate X.   (A) Less than 253.000 (B) 253.000 but less than 255.000 (C) 255.000 but less than 257.000 (D) 257.000 but less than 259.000 (E) 259.000 or more  (*A) Solution:*  *Call the one-year effective yield i.*  *1+i= [40/50]\*[80/(40+20)]\*[175/(80+80)]\*[X/(175+75)] (Jan 1-Dec 31)  (1+i)1/2 = [40/50]\*[80/(40+20)]\*[162.50/(80+80)] (Jan 1- June 30)  Hence (1+i)1/2 =1.083333 and X=$251.488* |

25.If not already done, please identifying your Privacy ID in the page footer (A, B, C or D) and code it as the answer for question 25.

Total marks: 240 (24 questions)