

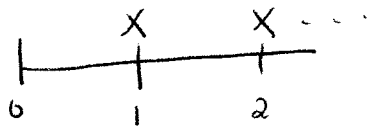
MAP 4170
Test 7

Name: _____
December 3, 2007

All problems are worth 10 points. Show work for full credit.

1. Calculate the duration of a common stock that pays dividends at the end of each year into perpetuity. Assume that the dividend is constant, and that the effective rate of interest is 8%.

(A) 9.5 (B) 10.5 (C) 11.5 (D) 12.5 (E) 13.5

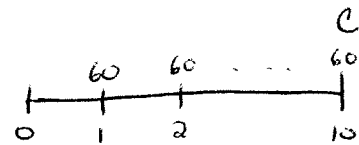


$$D = \frac{Xv + 2Xv^2 + 3Xv^3 + \dots}{Xv + Xv^2 + Xv^3 + \dots} = \frac{X \cdot (\overline{Ia})_{\infty}}{X \cdot a_{\infty}} = \frac{\frac{1}{i} + \frac{1}{i^2}}{\frac{1}{i}} = 1 + \frac{1}{i}$$

$$\therefore D = 1 + \frac{1}{.08} = 13.5$$

2. A 10-year 1000 face value 6% annual coupon bond with redemption value C has duration equal to 6.06 using an annual effective interest rate of 6%. Calculate C .

(A) 800 (B) 900 (C) 800 (D) 1000 (E) 1200



$$6.06 = \frac{60 \cdot (\overline{Ia})_{\overline{10}|.06} + 10Cv_{.06}^{10}}{60a_{\overline{10}|.06} + Cv_{.06}^{10}}$$

$$= \frac{60(36.9624) + 5.58395C}{441.6052 + .558395C}$$

$$\therefore C = 208$$

3-4. Problems 3 and 4 use the following information

Yield rates for 5% annual coupon bonds are:

$y_1 = 2\%$ = annual effective yield rate for 1-year bonds

$y_2 = 3\%$ = annual effective yield rate for 2-year bonds

$y_3 = 5\%$ = annual effective yield rate for 3-year bonds

3. Calculate the 3-year spot rate implied by these yield rates.

- (A) 4.88% (B) 4.94% (C) 5.00% (D) 5.06% (E) 5.12%

1-year spot rate: $r_1 = y_1 = .02$

2-year spot rate: Per 100 of par value,

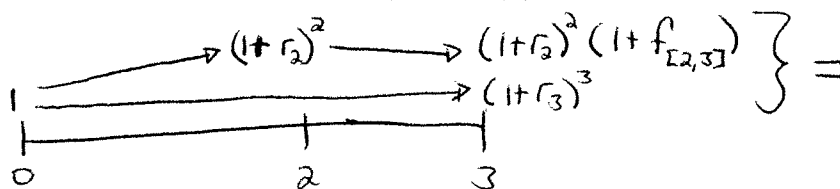
$$5a_{\overline{2}|.03} + 100v_{.03}^2 = \frac{5}{1+r_1} + \frac{105}{(1+r_2)^2} \xrightarrow{r_1=.02} r_2 \doteq 3.025\%$$

3-year spot rate: Per 100 of par value,

$$5a_{\overline{3}|.05} + 100v_{.05}^3 = \frac{5}{1+r_1} + \frac{5}{(1+r_2)^2} + \frac{105}{(1+r_3)^3} \xrightarrow[r_2=0.03025]{r_1=.02} r_3 \doteq 5.12\%$$

4. Calculate the 2-year forward rate, $f_{[2,3]}$, implied by these yield rates.

- (A) 2% (B) 3% (C) 5% (D) 8% (E) 9%



$$\therefore (1.03025)^2 (1 + f_{[2,3]}) = (1.0512)^3$$

$$\Rightarrow f_{[2,3]} \doteq 9.44\%$$

5. You are given the following information about two funds:

Fund X: January 1, 2005: Balance 50,000

May 1, 2005: Deposit 24,000; Pre-deposit Balance 50,000

November 1, 2005: Withdrawal 36,000; Pre-withdrawal Balance 77,310

December 31, 2005: Balance 43,100

Fund Y: January 1, 2005: Balance 100,000

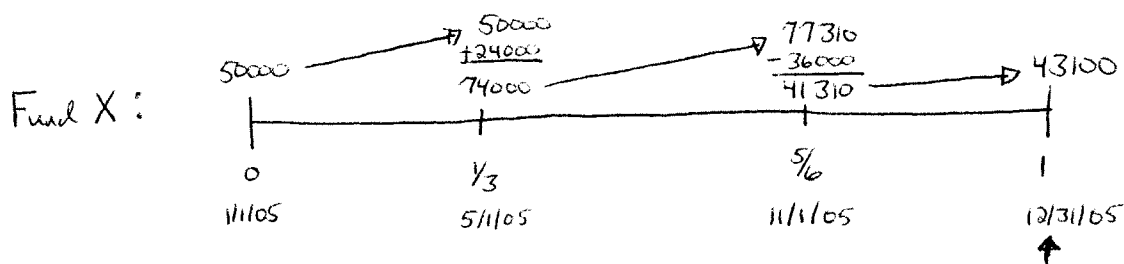
July 1, 2005: Withdrawal 15,000; Pre-withdrawal Balance 105,000

December 31, 2005: Balance F

Fund Y's time-weighted rate of return in 2005 is equal to Fund X's dollar-weighted rate of return in 2005.

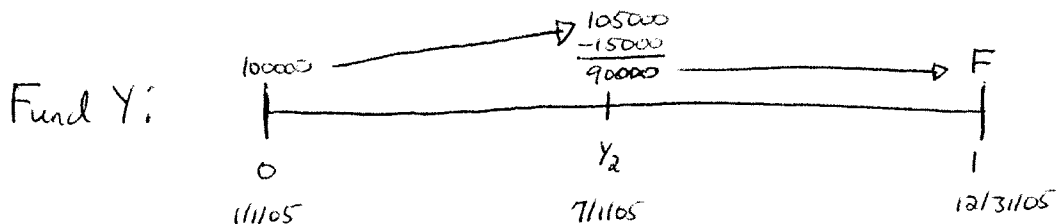
Calculate F .

- (A) 92,200 (B) 92,600 (C) 93,000 (D) 93,400 (E) 93,800



$$i_{Dw} = i : 50000(1+i) + 24000(1 + \frac{2}{3}i) - 36000(1 + \frac{1}{6}i) = 43100$$

$$i = i_{Dw} = \frac{5100}{60000} = .085$$



$$i_{Tw} = .085$$

$$\therefore 1 + .085 = \frac{105000}{100000} \cdot \frac{F}{90000} \Rightarrow F = 93000$$