

HW 4.2 (a) Key

1. A 1000 par value 17-year bond with 9% semiannual coupons was bought to yield 7% convertible semiannually. Determine the amount of premium amortized in coupon payment number 8. [7.c #03]

A) 3.95 B) 3.62 C) 3.78 D) 4.12 E) 4.28

$$r = 4.5\% \quad n = 34$$

$$i = 3.5\% \quad t = 8$$

$$P_t = (Fr - Ci) v^{n-t+1}$$

$$P_8 = (45 - 35) v^{27} = \boxed{3.95}$$

2. Laura buys two bonds at time 0. Bond X is a 1000 par value 38-year bond with 9.5% annual coupons. It is bought at a price to yield an annual effective rate of 6.5%. Bond Y is a 38-year par value bond with 5.25% annual coupons and a face amount of F . Laura pays P for the bond to yield an annual effective rate of 6.5%. During year 16, the write down in premium (principal adjustment) on bond X is equal to the write up in discount (principal adjustment) on bond Y. Calculate P . [7.c #04]

A) 1981 B) 1945 C) 1957 D) 1969 E) 1993

$$X: P_x = 95 a_{\overline{38}|6.5\%} + 1000 v^{38} \quad (\text{Premium})$$

$$Y: P_y = 0.0525 F a_{\overline{38}|6.5\%} + F v^{38} \quad (\text{Discount})$$

$$(95 - 65) v^{23} = F (0.065 - 0.0525) v^{23}$$

$$F = 2400 \rightarrow P_y = 126 a_{\overline{38}|6.5\%} + 2400 v^{38} = \boxed{1980.62}$$

3. A 1000 par value 34-year bond with annual coupons is bought to yield an annual effective rate of 3.5%. The amount for amortization of premium in year 12 is 18. The book value of the bond at the end of year 12 is X . Calculate X . [7.c #05]

A) 1602 B) 1525 C) 1551 D) 1577 E) 1628

Let K = coupon amount.

$$\text{Given info: } \textcircled{1} P = K a_{\overline{34}|3.5\%} + 1000 v^{34}$$

$$\textcircled{2} P_{12} = (K - 35) v^{23} = 18$$

$$\textcircled{3} B_{12} = X$$

$$\text{From } \textcircled{2}: (K - 35) v^{23} = 18 \rightarrow K = 74.71$$

$$\text{So, } B_{12} = 74.71 a_{\overline{22}|3.5\%} + 1000 v^{22} = \boxed{1602.29}$$

4. A 17-year bond with semiannual coupons has a redemption value of 100. It is purchased at a discount to yield 4% compounded semiannually. If the amount for accumulation of discount in coupon number 26 is 0.75, find the amount of discount in the original purchase price. [7.c #17]

☒ A) 22 B) 20 C) 21 D) 23 E) 24

$$n=34, F=C=100, i=2\%, K = \text{coupon amount}$$

$$P_{26} = (Z - K)v^9 = 0.75 \rightarrow K = 1.1037$$

$$\begin{aligned} \text{P/D formula tells us that total discount} &= (Z - K)a_{\overline{34}|2\%} \\ &= \boxed{21.96} \end{aligned}$$

$$\begin{aligned} \text{We could also find the price: } P &= 1.1037 a_{\overline{34}|2\%} + 100v^{34} \\ &= 78.04 \end{aligned}$$

$$\text{Amount of Discount} = 100 - 78.04 = 21.96$$

5. A 1000 par value bond bearing 5.5% annual coupons is purchased at a discount to yield an effective annual rate of 8.5%. The write-up in value during the first year is 8.12. Find the purchase price of the bond. [7.c #18]

☒ A) 743 B) 718 C) 726 D) 734 E) 751

$$P_1 = (85 - 55)v^n = 8.12$$

$$v^n = 0.2707$$

$$P = 1000 - 30 a_{\overline{n}|8.5\%}$$

$$= 1000 - 30 \frac{1 - v^n}{0.085}$$

$$= \boxed{742.59}$$

I used the
P/D Formula,
but you could
also use the
standard formula.