

HW 4.4 Key

1. Matt purchases a 23-year par value bond with 10% semiannual coupons at a price of 1522.11. The bond can be called at par value X on any coupon date starting at the end of year 11. The price guarantees that Matt will receive a nominal semiannual yield of at least 7%. Bert purchases a 23-year par value bond identical to the one purchased by Matt except it is not callable. Assuming a nominal semiannual yield of 7%, the cost of the bond purchased by Bert is P . Calculate P . [7.f #01]

(A) 1660 B) 1590 C) 1615 D) 1640 E) 1685

$$\text{Matt: } 1522.11 = 0.05 \times a_{\overline{46}|} + X v^{46}$$

Guaranteed to yield $\geq i = 3.5\%$. $r > i \Rightarrow \text{Premium (PEW)}$

$$1522.11 = 0.05 \times a_{\overline{22}|3.5\%} + X v^{22} \rightarrow X = 1240$$

$$\text{Bert: } P = 0.05 \times a_{\overline{46}|3.5\%} + 1240 v^{46} = \boxed{1662.24}$$

2. An investor purchases a 1000 bond redeemable at par that pays 9% semiannual coupons and matures in 16 years. The bond will yield 6% convertible semiannually to maturity. If the bond is called in 9 years, the minimum redemption value the investor needs to realize the same yield is X . Determine X . [7.f #02]

(A) 1169 B) 1155 C) 1162 D) 1176 E) 1183

$$P = 45 a_{\overline{32}|3\%} + 1000 v^{32} = 1305.8315$$

$$1305.8315 = 45 a_{\overline{18}|3\%} + X v^{18}$$

$$X = \boxed{1169.44}$$

3. An investor bought a 17-year bond with par value of 100,000 and 7% semiannual coupons. The bond is callable at par on any coupon date beginning with coupon number 16. Find the highest price paid that will yield a rate not less than $i^{(2)} = 9\%$. [7.f #03]

(A) 82,750 B) 82,340 C) 83,170 D) 83,580 E) 83,990

$$P = 3500 a_{\overline{34}|} + 100,000 v^{34}$$

Guaranteed to yield at least $i = 4.5\%$. $i > r \Rightarrow \text{Discount (DEB)}$

$$P = 3500 a_{\overline{34}|4.5\%} + 100,000 v^{34}$$

$$= \boxed{82,753.24}$$

4. An investor bought a 1000 par value bond with 7.5% annual coupons. The maturity date was exactly 18 years after the purchase date and the redemption value was to be equal to the par value. The bond was purchased at a premium to yield 6% per annum. 3 years later, just after payment of the coupon, the bond was called in at 102.8% of par value. What was the investor's rate of return on his investment? [7.f #04]

☒ A) 2.7% B) 2.2% C) 2.3% D) 2.4% E) 2.6%

$$P = 75 a_{\overline{18}|6\%} + 1000 v^{18} = 1162.4141$$

$$1162.4141 = 75 a_{\overline{3}|i} + 1028 v^3$$

$$i = \boxed{2.7\%}$$

5. A 1000 par value, 9% bond with quarterly coupons is called 7 years after issue. The bond matures for 1000 at the end of 12 years and is sold to yield a nominal rate of 7% compounded quarterly under the assumption that the bond will not be called. Calculate the redemption value, at the the end of 7 years, that will yield the purchaser the same nominal rate of 7% compounded quarterly. [7.f #05]

☒ A) 1084 B) 1090 C) 1097 D) 1103 E) 1110

$$P = 22.5 a_{\overline{48}|1.75\%} + 1000 v^{48} = 1161.4690$$

$$1161.4690 = 22.5 a_{\overline{28}|i} + X v^{28}$$

$$X = \boxed{1083.76}$$