Reading 54

FIXED-INCOME BOND VALUATION- PRICES & YIELDS

1. (C) over 14%.

Explanation

PMT = 12; N = 10; PV = -88; FV = 100; CPT → I = 14.3

(Module 54.1, LOS 54.a)

2. (C) greater than 5.2%.

Explanation

This bond is priced at a discount to par value because its 4% coupon is less than its 5.2% yield to maturity. As the bond gets closer to maturity, the discount will amortize toward par value, which means its price will increase if its yield remains unchanged. For its price to remain unchanged, its yield would have to increase.

Price with 10 years to maturity:

N = 10; I/Y = 5.2; PMT = 40; FV = 1,000; CPT PV = –908.23

Yield with 8 years to maturity:

N = 8; PMT = 40; FV = 1,000; PV = –908.23; CPT I/Y = 5.446%

(Module 54.1, LOS 54.b)

3. (B) 3.8%.

Explanation

Interpolating: 3.2% + [(4 – 3) / (6 – 3)] × (5.0% – 3.2%) = 3.8%

(Module 54.1, LOS 54.c)

4. (B) the value of a long-term bond is more sensitive to interest rate changes than the value of a short-term bond.

Explanation

Long-term, low-coupon bonds are more sensitive than short-term and high-coupon bonds. Prices are more sensitive to rate decreases than to rate increases (duration rises as yields fall).

(Module 54.1, LOS 54.b)

5. (B) 97.38.

Explanation

This value is computed as follows:

Present Value = $6/1.07 + 6/1.07^2 + 106/1.07^3 = 97.38$

Using the calculator:

I/Y = 7; FV = 100; N = 3; PMT = 6; CPT → PV = $97.38

(Module 54.1, LOS 54.a)

6. (C) $105.22.

Explanation

The clean price is the bond price without the accrued interest so it is equal to the quoted price.

(Module 54.1, LOS 54.a)

7. (C) $1,091.

Explanation

N = 20; I/Y = 9; PMT = 100 (0.10 × 1,000); FV = 1,000; CPT → PV = 1,091.

(Module 54.1, LOS 54.a)

8. (A) is traded at a market price higher than $1,000.

Explanation

A bonds price/value has an inverse relationship with interest rates. Since interest rates are increasing (from 8% when issued to 10% now) the bond will be selling at a discount. This happens so an investor will be able to purchase the bond and still earn the same yield that the market currently offers.

(Module 54.1, LOS 54.b)

9. (A) $5,743,874.

Explanation

Since current interest rates are lower than the coupon rate the bond will be issued at a premium. FV = $5,000,000; N = 20; I/Y = 3; PMT = (0.04)($5,000,000) = $200,000. Compute PV = $-5,743,874

(Module 54.1, LOS 54.a)

10. (A) decreases at a decreasing rate.

Explanation

The relationship between price and yield for an option-free bond is inverse and convex toward the origin. As the yield increases, the price decreases, but at a decreasing rate.

(Module 54.1, LOS 54.b)

11. (A) $102.

Explanation

As the bond was issued 4 years ago, its remaining maturity is 16 years. The price
is calculated as follows:

$PMT = 6\% / 2 x \$100 = \$3$

$N = 16 x 2 = 32$

$I / Y = 5.8\% / 2 = 2.9\%$

$FV = \$100$

CPT PV to obtain $102.07

(Module 54.1, LOS 54.a)

12. (B) **$1,075.82.**

Explanation

FV = 1,000
N = 5
I = 10
PMT = 120
CPT = ?
PV = 1,075.82.
(Module 54.1, LOS 54.a)

13. (C) **Yes, the bond is undervalued by $64.**

Explanation

FV = 1,000
PMT = 37.5
N = 12
I/Y = 3%
CPT PV = –1,074.66
1,074.66 – 1,011 = 64
(Module 54.1, LOS 54.a)

14. (C) **have low liquidity.**

Explanation

For bonds that do not trade or trade infrequently, matrix pricing uses the yields on similar issues that do trade to estimate the required yield on the illiquid bonds.
(Module 54.1, LOS 54.c)

15. (B) **$1,091.**

Explanation

This is a present value problem 5 years in the future.
N = 20, PMT = 100, FV = 1000, I/Y = 9
CPT PV = -1,091.29
The $900 purchase price is not relevant for this problem.
(Module 54.1, LOS 54.a)

16. (B) **yields to maturity of other bonds.**

Explanation

Matrix pricing is a method for valuing a non-traded or infrequently traded bond based on the yields to maturity of similar bonds that are traded more frequently.
(Module 54.1, LOS 54.c)

17. (A) **30-day months and 360-day years.**

Explanation

Accrued interest for corporate bonds is typically calculated using the 30/360 method. For government bonds, accrued interest is typically calculated using the actual/actual method.
(Module 54.1, LOS 54.a)

18. (A) $875.38.

Explanation

Using the financial calculator: N = 10 × 2 = 20; PMT = $80 / 2 = $40; I/Y = 10 / 2 = 5%; FV =1,000; Compute the bond's value PV = –875.38.

(Module 54.1, LOS 54.a)

19. (B) $1,196.

Explanation

This problem can be solved most easily using your financial calculator. Using semiannual payments, I = 6/2 = 3%; PMT = 80/2 = $40; N = 15 × 2 = 30;
FV = $1,000; CPT → PV = $1,196.

(Module 54.1, LOS 54.a)

20. (B) $1,068.72.

Explanation

Each of the remaining cash flows on the bond is discounted at the annual rate of 4.5%.

Period	Payment	Discount	PV
1	$1,000 × 7% = $70	(1.045)1	$ 66.99
2	$1,000 × 7% = $70	(1.045)2	$ 64.10
3	$1,000 × 7% = $70	(1.045)3	$ 61.34
3	$1,000 principal	(1.045)3	$ 876.30
Total Present Value of Cash Flows			**$1,068.73**

The present value can also be determined with a financial calculator. N = 3, I = 4.5%, PMT = $1,000 × 7%, FV = $1,000. Solve for PV = $1,068.724.

(Module 54.1, LOS 54.a)

21. (A) $775.

Explanation

The semiannual coupon payment is $1,000 × (0.12 / 2) = $60.
FV = 1,000; PMT = 60; N = 15 × 2 = 30; I/Y = 16 / 2 = 8; CPT → PV= –774.84

(Module 54.1, LOS 54.a)

22. (B) $107.31.

Explanation

Price at 8% is N = 60, FV = $1,000, I = 4%, PMT = $32.50, CPT PV = $830.32; price at 7% is N = 60, FV = $1,000, I = 3.5%, PMT = $32.50, CPT PV = $937.64. Change in price is $937.64 – $830.32 = $107.31.

(Module 54.1, LOS 54.a)

23. (A) $779.01.

Explanation

The value of the bond is computed as follows:

Bond Value = $1,000 / 1.0425^6 = $779.01.

N = 6; I/Y = 4.25; PMT = 0; FV = 1,000; CPT → PV = 779.01.

(Module 54.1, LOS 54.a)

24. (A) below par at issuance, but above par three months later.

Explanation

A bond issued at a yield higher than its coupon will be priced below par, or at a discount. Three months later, the yield has declined to 4.2% and the bond will trade at a premium to par, reflecting the fact that the coupon is now higher than the yield.

(Module 54.1, LOS 54.b)

25. (C) discount, and the yield to maturity has increased since purchase.

Explanation

The yield on the bonds has increased, indicating that the value of the bonds has fallen below par. The bonds are therefore trading at a discount. If a bond is selling at a discount, the bond's current price is lower than its par value and the bond's YTM is higher than the coupon rate. Since Logan bought the bonds at par (coupon = YTM = 6%), the YTM has increased.

(Module 54.1, LOS 54.b)

26. (C) $814.

Explanation

This bond has no cash flows for the first five years. It then has a $100 cash flow for years 6 through 10. Additionally, the accrued interest ($500) that wasn't paid in the first five years would have to be paid at the end, along with the principal. A financial calculator using the CF/NPV worksheet can handle this type of problem. The required inputs are CF_0 = 0, CF_1 = 0, F_1 = 5, CF_2 = 100, F_2 = 4, CF_3 = 1,600, F_3 = 1, NPV, I = 10%, CPT = 813.69. Note that CF_3 is made up of the principal ($1,000) plus the remaining $100 coupon plus the accrued interest ($500) that was not paid during the first five years of the bond's life.

(Module 54.1, LOS 54.a)

27. (B) A coupon bond can be viewed as a collection of zero-coupon bonds.

Explanation

Zero-coupon bonds are quite special. Because zero-coupon bonds have no coupons (all of the bond's return comes from price appreciation), investors have no uncertainty about the rate at which coupons will be invested. Spot rates are defined as interest rates used to discount a single cash flow to be received in the future. Any bond can be viewed as the sum of the present value of its individual cash flows where each of those cash flows are discounted at the appropriate zero-coupon bond spot rate.

(Module 54.1, LOS 54.a)

28. (A) $170.

Explanation

Using the 10% yield to maturity, the price of the bond originally is $754.22:

N = 10; I/Y = 10; PMT = 60; FV = 1000; CPT PV = $754.22

Using the 14% yield to maturity, the price of the bond changes to $582.71:

N = 10; I/Y = 14; PMT = 60; FV = 1000; CPT PV = $582.71

Therefore, the price is expected to change from $754.22 to $582.71, a decrease Of $171.51.

(Module 54.1, LOS 54.a)

29. (B) $1,000.

Explanation

Since yields are projected to be 10% and the coupon rate is 10%, we know that the bond will sell at par value.

(Module 54.1, LOS 54.a)

30. (C) $2,044.

Explanation

Given the shift in interest rates, Bond R has a new value of $1,017 (N = 4; PMT = 70; FV =1,000; I/Y = 6.50%; CPT → PV = 1,017). Bond S's new value is $1,027 (N = 7; PMT = 70; FV =1,000; I/Y = 6.50%; CPT → PV = 1,027). After the increase in interest rates, the new value of the two-bond portfolio is $2,044 (1,017 + 1,027).

(Module 54.1, LOS 54.a)

31. (C) $23.06.

Explanation

With YTM = 10.45% (I/Y = 5.225), PMT = 40, N = 24, FV = 1,000, PV = $834.61. With YTM =10.07% (I/Y = 5.035), PV = $857.67, an increase of $23.06.

(Module 54.1, LOS 54.a)

32. (C) 0.84.

Explanation

The bond price change is computed as follows:

Bond Price Change = New Price – Old Price = $(5/1.06 + 105/1.06^2) - (5/1.06 + 5/1.06^3 + 105/1.06^3)$ = 98.17 – 97.33 = 0.84.

(Module 54.1, LOS 54.a)

33. (A) $1,092.46.

Explanation

N = 6

PMT = (0.10)(1,000) = 100

I = 8

FV = 1,000

CPT = ?

PV = 1,092.46

(Module 54.1, LOS 54.a)

34. (B) lower.

Explanation

A premium bond sells at more than face value, thus as time passes the bond value will converge upon the face value.

(Module 54.1, LOS 54.b)

35. (A) 4,674,802 4,871,053

Explanation

Present Value:

Since the current interest rate is above the coupon rate the bond will be priced at a discount. FV = \$5,000,000; N = 20; PMT = (0.04)(5 million) = \$200,000; I/Y = 4.5; CPT → PV = -\$4,674,802

Value in 7 Years:

Since the current interest rate is above the coupon rate the bond will be priced at a discount. FV = \$5,000,000; N = 6; PMT = (0.04)(5 million) = \$200,000; I/Y = 4.5; CPT → PV = -\$4,871,053

(Module 54.1, LOS 54.a)

36. (C) \$1,081.00.

Explanation

The full price is equal to the flat or clean price plus interest accrued from the last coupon date. Here, the flat price is 1,000 × 104.75%, or 1,000 × 1.0475 = 1,047.50. Thus, the full price = 1,047.50 + 33.50 = 1,081.00.

(Module 54.1, LOS 54.a)

37. (B) \$101,698.

Explanation

N = 13 × 4 = 52; FV = 100,000; PMT = 1,800; I/Y = 7 / 4 = 1.75;
CPT → PV = 101,698.

(Module 54.1, LOS 54.a)

38. (C) remain constant.

Explanation

A zero coupon bond will be issued at a discount (yield > coupon). If market rates remain constant, the price will rise toward par value as maturity approaches. The path that the price takes if the yield does not change is known as the constant-yield price trajectory.

(Module 54.1, LOS 54.b)

39. (B) \$952.85.

Explanation

The coupon payment each six months is (\$1,000)(0.075 / 2) = \$37.50. To value the bond, enter FV = \$1,000; PMT = \$37.50; N = 10 × 2 = 20; I/Y = 8.2 / 2 = 4.1%; CPT → PV = –952.85.

(Module 54.1, LOS 54.a)

40. (B) Premium bond, required market yield is less than 6.75%.

Explanation

When the issue price is greater than par, the bond is selling at a premium. We also know that the current market required rate is less than the coupon rate of 6.75%, because the bond is selling at a premium.

For the examination, remember the following relationships:

Type of Bond	Market Yield to Coupon	Price to Par
Premium	Market Yield < Coupon	Price > Par
Par	Market Yield = Coupon	Price = Par
Discount	Market Yield > Coupon	Price = Par

(Module 54.1, LOS 54.b)

41. (C) $390.

Explanation

Because the yield is quoted on a semiannual-bond basis, we must divide the yield by 2 to get the bond's 6-month holding period yield, and multiply the number of years by 2 to get the number of semiannual periods to maturity.

I/Y = 9.6 / 2 = 4.8; FV = 1,000; N = 10 × 2 = 20; PMT = 0; CPT → PV = –391.54

(Module 54.1, LOS 54.a)

42. (B) $1,079.

Explanation

In 6 years, there will be 14 years (20 – 6), or 14 × 2 = 28 semi-annual periods remaining of the bond's life So, N = (20 – 6)(2) = 28; PMT = (1,000 × 0.10) / 2 = 50; I/Y = 9/2 = 4.5; FV = 1,000; CPT → PV = 1,079.

Note: Calculate the PV (we are interested in the PV 6 years from now), not the FV.

(Module 54.1, LOS 54.a)

43. (C) $879.

Explanation

The price of a bond is equal to the present value of future cash flows discounted at the yield to maturity.

N = 20 × 2 = 40; I/Y = 8.25/2 = 4.125; PMT = 70/2 = 35; FV = 1,000; Compute PV = 878.56.

Note that the yield to call cannot be used here to calculate the bond value, because the call date is not given.

(Module 54.1, LOS 54.a)

44. (B) lower than the yield to maturity.

Explanation

The current yield (unlike the YTM) ignores movements toward par value along the constant-yield price trajectory, and therefore will not capture the return attributable to a discount bond's increase in price toward par as maturity approaches.

(Module 54.1, LOS 54.b)

45. (B) equals interest earned from the previous coupon to the sale date.

Explanation

This is a correct definition of accrued interest on bonds. The other choices are false. Accrued interest is not discounted when calculating the price of the bond. The statement, "covers the part of the next coupon payment not earned byseller," should read, "…not earned by *buyer."*

(Module 54.1, LOS 54.a)

46. (B) $934.96.

Explanation

N = 20, I = 9/2 = 4.5, PMT = 80/2 = 40, FV = 1,000, compute PV = $934.96

(Module 54.1, LOS 54.a)

47. (B) decreased.

Explanation

The path that a bond's price follows over its maturity assuming the yield is held constant is known as the constant yield price trajectory. In this case it is being held constant at 8%. Given the bond is sold at a premium (coupon > YTM), its price will decrease as it moves toward par value.

Price at issuance: N = 10; FV = 1,000; PMT = 100; I = 8; CPT → PV = 1,134

Price after one year: N = 9; FV = 1,000; PMT = 100; I = 8; CPT → PV = 1,125

(Module 54.1, LOS 54.b)

48. (A) $838.53.

Explanation

N = 12 × 4 = 48, FV = 1,000, PMT = 50/4 = 12.5, I/Y = 7.0/4 = 1.75; CPT PV = −838.53.

(Module 54.1, LOS 54.a)

49. (C) decreased.

Explanation

The path that a bond's price follows over its maturity assuming the yield is held constant is known as the constant yield price trajectory. In this case it is being held constant at 8%. Given the bond is sold at a premium (coupon > YTM), its price will decrease as it moves toward par value.

Price at issuance: N = 10; FV = 1,000; PMT = 100; I = 8; CPT → PV = 1,134

Price after one year: N = 9; FV = 1,000; PMT = 100; I = 8; CPT → PV = 1,125

(Module 54.1, LOS 54.b)

50. (B) $891.40.

Explanation

The flat price of the bond is the quoted price, 89.14% of par value, which is $891.40.

(Module 54.1, LOS 54.a)