7.10 Interest Rate Risk and Return

Question 1
A coupon bond's Macaulay duration is *most accurately* described as the holding period over which:
A. the value of cash flows received equal the cost of buying the bond.
B. changes in reinvestment income offset changes in the bond's price.
C. the bond earns a risk-free return if hedged by shorting a government bond.

Question 2
Five years ago, an investor purchased a 10-year, 7% semiannual coupon paying bond for 98. Today the bond is sold for 98.25. The capital gain or loss per 100 of par value is *closest* to:
A. −1.75
B. −0.57
C. 0.25

Question 3
A 10-year, zero-coupon bond is priced at 64.3928 per 100 of par value and is trading at a 4.50% yield-to-maturity using annual compounding. Assuming a 10-basis point change in yield-to-maturity, the approximate modified duration of the bond is *closest* to:
A. 9.57
B. 9.62
C. 10.00

Question 4
An investor with a 10-year investment horizon purchases a noncallable 10-year, 7% annual coupon bond. The bond purchase price is 107.360087 per 100 of par value, with a 6% YTM. The bond's annual modified duration is 7.180. The duration gap at the time of the investment is *closest* to:
A. −2.82
B. −2.39
C. 0.00

Question 5
An investor buys a newly issued 20-year bond at par. The bond pays a 6% annual coupon. Shortly after purchase, the bond's YTM falls to 5% and stays at that level until the bond is sold at the end of three years. If the reinvestment rate over the period is 5%, the investor's annualized rate of return over the three-year investment horizon is *closest* to:
A. 8.94%
B. 9.19%
C. 10.06%

Question 6
An investor buys a bond that matures in 22 years. The bond has a 7% coupon rate and pays semiannually. The investor's price was 112.1271 when the bond's YTM was 6%. Before the next coupon date, the bond's YTM rises to 8% and stays at that level until the bond is sold at the end of 6 years. If the reinvestment rate over the period is 8%, the investor's annualized rate of return over the 6-year investment horizon is *closest* to:
A. −3.41%
B. +2.89%
C. +4.22%

Question 7
A 7% semiannual payment corporate bond that matures on January 11, 2035 is purchased for settlement on its coupon payment date of July 11, 2023. If the bond is priced with a 10.2% YTM, the bond's annual Macaulay duration is *closest* to:
A. 7.1
B. 7.6
C. 15.2

Question 8
A bond matures in 3 years and pays a 7% annual coupon. The bond is currently trading at 104.0469 per 100 par value with a 5.50% yield-to-maturity. The Macaulay duration of the bond is *closest* to:
A. 2.64
B. 2.81
C. 2.93

Question 9
An investor purchases a bond for a price of 111.62. The bond is a 10-year callable bond with a 7% coupon paid annually. If the bond's benchmark yield curve shifts by 30 basis points and its YTM changes by 25 basis points, the bond's price is expected to be:

- 110.23 if interest rates rise, or
- 112.99 if interest rates fall.

Based on only this information and using the most appropriate measure of duration, the bond's duration is *closest* to:
A. 4.12
B. 4.95
C. −19.91

Question 10
An investor purchases a bond with 5 years until maturity, a 4% annual coupon payment, and a YTM of 4.25%. The investor holds the bond until maturity. After purchase and before the first coupon, if the YTM for similar bonds increases to 4.5% due to a rise in interest rates and remains at that level for the life of the bond, then the value of the investor's reinvested coupons at maturity is *closest* to:

A. 21.67
B. 21.77
C. 21.88

Question 11
An investor buys a bond at a price below 100% of par value. The investor later sells the bond prior to maturity. The gain or loss on sale will *most likely* be the difference between the sale price and the:
A. original purchase price.
B. carrying value based on straight-line amortization of the original discount.
C. carrying value based on the YTM at purchase and the time remaining to maturity.

Question 12
A manager is concerned with identifying a noncallable coupon bond that minimizes the risk of funding a future liability. Which type of duration is *most appropriate* for this manager to use?
A. Key rate duration
B. Modified duration
C. Macaulay duration

Question 13
An investor buys a 20-year bond at par value. The bond pays a 4% semiannual coupon and has an approximate modified duration of 13.68. The investor sells the bond one year later after interest rates have risen by 100 basis points. Which of the following sources *most likely* accounts for the largest portion of the investor's holding period return?
A. Coupon income
B. Capital gain or loss
C. Interest on interest income

Question 14
An investor buys a previously issued bond that has 12 years remaining to maturity at a price of 92.4639 per 100 par value. The bond has an 8.0% YTM and pays a 7.0% annual coupon. Two years later the bond is sold for 96.5680 at a YTM of 7.5%. The carrying value used to determine the capital gain is *closest* to:
A. 93.2048
B. 93.2899
C. 93.7199

Question 15
An investor purchases a 20-year 6% annual coupon bond at 100% of par value. 10 years later the bond has a YTM of 10% and is trading at 75.42 per 100 of par value. Assuming a reinvestment rate of 10% since purchase, the largest effect on the bond's holding period rate of return is *most likely* the:

A. capital loss.
B. coupon income.
C. reinvestment income.

Question 16
A 20-year zero-coupon bond has a YTM of 4%. Assuming semi-annual compounding, its modified duration is *closest* to:
A. 19.23
B. 19.61
C. 20.00

Question 17
An investor with a 2-year investment horizon buys a 10-year government bond that pays a 3% annual coupon. The resulting mismatch between the 10-year bond's duration and the investment horizon results in the investor having the *greatest* exposure to:
A. price risk.
B. liquidity risk.
C. reinvestment risk.

Question 18
A noncallable bond that pays a 6% annual coupon has exactly 4 years until maturity. The bond is priced at 98.2871 per 100 par value and has a 6.50% YTM. Assuming a 10–basis point change in YTM, the bond's approximate modified duration is *closest* to:
A. 3.45
B. 3.50
C. 6.89

Question 19
A callable bond's coupon rate is 100 basis points (bps) below yields-to-maturity on noncallable bonds having the same time to maturity and credit risk. If market yields decline by 200 bps, the callable bond's effective duration *most likely*:
A. decreases.
B. remains unchanged.
C. increases.

Question 20
A corporation buys a 5-year default-risk-free government bond to fund a lump-sum liability due in five years. The bond is noncallable and pays coupons semiannually. Which of the following types of risk does the corporation most likely have the *greatest* exposure to?
A. Inflation risk
B. Market price risk
C. Reinvestment risk

Question 21
An investor buys a bond for 115.443470 per 100 par value. The bond has 10 years left until maturity, a 5% YTM, and a 7% annual coupon. Four years later, the bond is sold for 112.894681 at a YTM of 4.5%. The capital gain or loss is *closest* to a:
A. 2.5488 loss.
B. 2.7433 gain.
C. 3.6286 gain.

Question 22
An investor buys a bond that matures in exactly 20 years. The bond pays a 6% annual coupon, is trading at an 8% YTM, and is priced at 80.3637 per 100 par value. Assuming a constant reinvestment rate of 8%, if the bond is held until maturity which of the following sources *most likel*y contributes the largest portion of the investor's total return?
A. Coupon payments
B. Principal repayment
C. Reinvestment income

Question 23
An analyst has collected information on three bonds, each of which matures in 10 years and uses an annual compounding convention:

Bond	Coupon Rate	Yield-to-maturity
A	6%	4.50%
B	3%	4.50%
C	0%	4.50%

Which of the bonds *most likely* has the shortest Macaulay duration?
A. Bond A
B. Bond B
C. Bond C

Question 24
A noncallable bond's approximate duration is closest to its effective duration when:
A. it has a long time to maturity.
B. its benchmark curve is relatively flat.
C. it is priced at a significant premium to its par value.

Question 25
Investor X and Investor Y purchase identical bonds with 3 years until maturity, a YTM of 8.88%, an annual coupon of 6%, and a price of 92.7. After purchase and before the first coupon, the YTM for the bonds drops to 7.9% and remains at that level for the life of the bonds. Investor X's time horizon is 2 years, and Investor Y's time horizon is 3 years. Investor X's annual rate of return on investment is *most likely*:

A. less than Investor Y's rate of return.
B. equal to Investor Y's rate of return.
C. greater than Investor Y's rate of return.

Question 26
The modified duration of a fixed-rate coupon bond with no embedded options *most likely quantifies the:*
A. sensitivity of the bond's price to a change in its YTM.
B. weighted average time to receipt of the bond's cash flows.
C. expected standard deviation of returns over the life of the bond.

Question 27
A 20-year 8% semiannual pay coupon bond is trading at a 7% yield-to-maturity. It has an annual Macaulay duration of 10.76. The bond's annual modified duration is *closest* to:
A. 10.06
B. 10.35
C. 10.40