

**Midterm Practice Exam #3 (sections 3.5, 3.6 and chapters 4, 5, 6.1, 6.2, 6.3, 6.4, 6.5)**

- A company borrows \$33,210 from a bank today. They are to pay off this loan with ten annual payments of \$4500. The first payment is to be made one year from today. Using linear interpolation, what is the nominal rate of interest,  $j_1$  that the bank is charging on this loan?

You are given:  $a_{\overline{10}|.05} = 7.7217$   $a_{\overline{10}|.06} = 7.3601$  ,  $a_{\overline{10}|.07} = 7.0236$

(A)  $j_1 < 5.90\%$  (B)  $5.90\% \leq j_1 < 6.00\%$   
(C)  $6.00\% \leq j_1 < 6.10\%$  (D)  $6.10 \leq j_1$
- A student wishes to accumulate \$4000. She makes quarterly deposits of \$200 into an account, with the 1<sup>st</sup> quarterly deposit being made on January 1, 2006. The account earns interest at  $j_4 = 6\%$ . What is the size of the final, smaller quarterly deposit (drop payment) and on what date will this final deposit be made?

(A) A final deposit of \$159.73 is made on April 1, 2010  
(B) A final deposit of \$102.12 is made on April 1, 2010  
(C) A final deposit of \$159.73 is made on July 1, 2010  
(D) A final deposit of \$102.12 is made on July 1, 2010
- Bank A offers you a loan which you will repay over 5-years at  $j_{12} = 6\%$  with monthly payments of \$1500. Bank B offers you the same loan amount, but at  $j_4 = 6\%$ , which you will repay over 5-years with quarterly payments of \$R. What is the maximum value of R for you to even consider Bank B?

(A) \$4500.00 (B) \$4519.19 (C) \$4522.54 (D) \$4525.88
- What is the accumulated value of 10 deposits of \$1200 immediately after the 10<sup>th</sup> deposit, if  $j_4 = 10\%$ ?

(A) \$19,478.09 (B) \$19,375.62 (C) \$19,124.91 (D) \$18,972.32
- Charlie makes monthly deposits into an account earning  $j_{12} = 6\%$ . His first deposit is \$P and each monthly deposit thereafter increases by \$80. One month after his 24<sup>th</sup> deposit, he has accumulated \$36,415. What is P? You are given:  $s_{\overline{24}|.0005} = 25.4320$

(A) \$523.82 (B) \$526.44 (C) \$528.30 (D) \$530.95
- A woman has bought a house and makes mortgage payments of \$400 every two-weeks for 25 years. If the mortgage interest rate is  $j_2 = 7\%$ , what is the size of her original mortgage loan? (nearest dollar)

(A) \$114,382 (B) \$117,713 (C) \$120,104 (D) \$123,927
- An endowment fund is set up today. It provides payments of \$1500 a year for 6-years (first payment one year from now) followed by \$2000 a year thereafter forever. If the interest rate is  $j_1 = 6\%$ , how much is needed to be deposited (invested) today? (answer to nearest dollar)

(A) \$29,545 (B) \$30,875 (C) \$38,889 (D) \$40,709
- You deposit \$5000 into a fund earning  $j_2 = 6\%$ . Each succeeding semi-annual deposit is increased by 4%. What is the accumulated value immediately after your 15<sup>th</sup> deposit? (answer to nearest dollar)

(A) \$148,904 (B) \$125,133 (C) \$121,488 (D) \$96,714
- A couple borrows \$A today at  $j_1 = 12\%$ . The loan is to be repaid over 4-years with quarterly payments of \$500, first payment due 3-months from today. If simple interest is credited for fractional interest periods, what is A?

(A) \$6530.30 (B) \$6348.06 (C) \$6341.61 (D) \$6280.55

10. A scholarship fund has \$50,000 in it today and it earns interest at  $j_2 = 8\%$ . From this amount, you wish to pay out semi-annual scholarships of  $\$R$ , first scholarship 6-months from now, and each succeeding semi-annual scholarship thereafter increases by \$50 forever. What is  $R$ ?

- (A) \$3375                      (B) \$2000                      (C) \$1950                      (D) \$750

**Use the following information for the next THREE questions:**

**A loan is being repaid over 8 years with 32 quarterly payments of \$362.19 at  $j_4 = 8\%$ .**

11. If the total amount of interest paid over the life of the loan is \$3090.08, what is the outstanding balance of the loan immediately after the 18<sup>th</sup> payment using the Sum-of-Digits method?

- (A) \$4982.87                      (B) \$4456.16                      (C) \$4384.76                      (D) \$4069.90

12. Under the amortization method, how much of the 3<sup>rd</sup> payment goes towards interest on the loan?

- (A) \$158.24                      (B) \$162.24                      (C) \$199.95                      (D) \$203.95

13. Under the amortization method, what is the outstanding balance of the loan immediately after the 15<sup>th</sup> payment?

- (A) \$5326.58                      (B) \$5261.81                      (C) \$5176.37                      (D) \$4653.87

14. \$10,000 is borrowed for 10 years and a sinking fund is used to repay the principal. Both the loan interest payments and the sinking fund deposits are made at the end of each year. The sinking fund earns interest at 5% compounded annually. The annual expense (annual cost) of debt is \$1445. What is the annual interest rate being charged on the loan?

- (A) 7.95%                      (B) 6.50%                      (C) 5.87%                      (D) 5.0%

15. A loan of  $\$A$  is taken out at  $j_{12} = 6\%$  and is repaid with monthly payments of \$184.91. The principal portion of the 12<sup>th</sup> monthly payment is \$115.00. What is  $A$ ? (answer to nearest dollar)

- (A) \$12,564                      (B) \$12,684                      (C) \$15,210                      (D) \$15,318

**Use the following information for the next TWO questions:**

**A corporation takes out a \$100,000 loan to be repaid over 6-years with quarterly payments at  $j_4 = 10\%$ . The total interest to be paid on the loan over the 6 years is \$34,190.77.**

16. Using the sum of digits method, the outstanding balance of the loan immediately after the 16<sup>th</sup> payment is \$40,627.40. How much of the 17<sup>th</sup> payment goes towards interest assuming the sum of digits method?

- (A) \$1218.82                      (B) \$1025.72                      (C) \$1015.69                      (D) \$911.75

17. Under the amortization method, the outstanding balance of the loan after 4 years is \$40,090.26. At this time the company refinances the loan, without penalty. The new loan rate is  $j_4 = 8\%$  and the company makes an additional lump sum payment of \$5000. Using the amortization method, what is the new quarterly payment, assuming the loan is still paid back in full after 6 years?

- (A) \$4790.16                      (B) \$4893.95                      (C) \$5472.71                      (D) \$5591.28

18. A loan of  $A$  is to be amortized over 10 years with semi-annual payments. The interest rate on the loan is  $j_2 = 10\%$  and the semi-annual payment is  $R$ . After 3 years, the interest rate on the loan rises to  $j_2 = 12\%$ . Which of the following will give the correct outstanding balance after 3 years?

	<u>prospectively</u>	<u>retrospectively</u>
(A)	$R a_{\overline{14} 0.06}$	$A(1.06)^6 - R s_{\overline{6} 0.06}$
(B)	$R a_{\overline{14} 0.06}$	$A(1.05)^6 - R s_{\overline{6} 0.05}$
(C)	$R a_{\overline{14} 0.05}$	$A(1.06)^6 - R s_{\overline{6} 0.06}$
(D)	$R a_{\overline{14} 0.05}$	$A(1.05)^6 - R s_{\overline{6} 0.05}$

19. A city borrows \$1,000,000 at  $j_2 = 9.5\%$ . They pay off this loan over eight years using the sinking fund method. The sinking fund interest rate is  $j_2 = 8\%$ . What is the book value of the debt after 5 years? (loan interest and sinking fund deposits are made semi-annually; answer to nearest dollar)

(A) \$429,710                      (B) \$449,880                      (C) \$463,738                      (D) \$482,113

20. A \$900 bond, redeemable for \$950, is bought on July 23, 2008 at a market quotation of  $q = 101.35$ . The accrued interest is \$29.58. What is the flat price of the bond?

~~(A) \$1043.08                      (B) \$979.58                      (C) \$941.73                      (D) \$929.58~~

21. A \$20,000 bond is purchased that matures in 10 years. The bond is redeemable at par. This bond has coupons payable quarterly and the quarterly coupon amount is \$400. What is the current market value of the bond if 10 year bonds are being priced today to yield  $j_2 = 6\%$ ? (nearest dollar)

(A) \$17,025                      (B) \$20,000                      (C) \$21,040                      (D) \$23,064

22. A \$1000 bond is purchased at a price to yield 6.5% compounded annually. The bond has 13% annual coupons. You are given that the interest portion of the second coupon is \$93.38. What is the price of the bond? (nearest dollar)

(A) \$1410                      (B) \$1471                      (C) \$1500                      (D) \$1837

23. A \$5000 bond with interest at  $j_2 = 10\%$  is redeemable at 98 in 10 years. It is purchased at a pricing yield rate of  $j_2 = x\%$  and the resultant price is \$5080. Using the method of averages, determine  $x$ .

~~(A) 9.66%                      (B) 9.74%                      (C) 10.38%                      (D) 4.88%~~

24. A 10-year \$5000 bond redeemable at par, is purchased by Ms. Gates that pays coupons at  $j_2 = 6\%$ . She purchases the bond for \$3753.78 to yield  $j_2 = 10\%$ . She then immediately sells all of the coupons to another investor at a price of \$2038.55. What rate of return,  $j_2$  does Ms. Gates earn on her investment?

~~(A) 10.99%                      (B) 11.29%                      (C) 10.00%                      (D) 8.00%~~

25. A \$1000 bond with semi-annual coupons at  $j_2 = 8\%$  is redeemable at 99 in 10 years. It is callable at 105 in 5 years. Determine the highest purchase price to guarantee a yield of at least  $j_2 = 7\%$ .

You are given:  $a_{\overline{20}|0.035} = 14.2124$  and  $a_{\overline{10}|0.035} = 8.3166$

~~(A) \$1086.42                      (B) \$1077.03                      (C) \$1071.06                      (D) \$1066.04~~

26. A 3-year bond pays level semi-annual coupons and is bought to yield  $j_2 = 15\%$ . The interest portion of the first coupon is \$57.40. The amount of the write-up in the book value of the bond at the time of the last coupon payment is \$46.51. What is the coupon paid each period?

(A) \$25.00                      (B) \$27.26                      (C) \$87.54                      (D) \$89.80

~~27. A \$1000 bond paying semi-annual coupons of \$35 is redeemable at par on October 30, 2012. It was purchased on June 23, 2008 at a price that yields  $j_2 = 8\%$ . Determine the market price,  $Q$ . The day counts for April 30, June 23, and October 30 are day are 120, 174, and 303 respectively.~~

~~You are also given:  $a_{\overline{9}|0.04} = 7.43533$  and  $a_{\overline{8}|0.04} = 6.73274$~~

~~(A) \$984.36 (B) \$974.03 (C) \$967.26 (D) \$963.70~~

28. Which of the following statements is (are) false:

(I) A bond has level coupons payable at  $j_2 = 5\%$  and is redeemable ( $C$ ) at par. If this bond is purchased at a price ( $P$ ) based on  $j_2 = 6.5\%$ , then  $P > C$ .

~~(II) The flat price of a bond is always greater than the quoted price of the bond.~~

(A) Both of them (B) I only (C) II only (D) Neither of them