Actuarial Science 2053 – Test 1 -- Practice 1

1. A $12,000 short term loan was taken out on April 3, 2009 at a simple interest rate of 8%. Interest is to be calculated using ordinary interest (Banker's rule). The amount repaid was $12,488.00. On what date in 2009 was the loan repaid?

   (A) October 12 (B) October 9 (C) October 6 (D) October 3

2. Using the Merchant's rule, a debt of $4000 is paid off as follows: $2000 in 30 days and a final payment of $2026.51 in 80 days. What simple interest rate, r, was used?

   (A) $r < 3.5\%$ (B) $3.5\% < r < 4.0\%$ (C) $4.0\% < r < 4.5\%$ (D) $r > 4.5\%$

3. What simple discount rate d is equivalent to a simple interest rate of 8% over a 200-day period?

   (A) 9.00% (B) 8.68% (C) 8.58% (D) 7.66%

4. A merchant receives an invoice for a motor boat for $5000 with term 3/30, n/100. In order to take advantage of discount, he wants to borrow the required money. If he can borrow at $r = 18\%$, how much money does he save/lose?

   (A) −$17.42 (B) −$22.60 (C) $22.60 (D) $17.42

Using the following information for question 5 and 6:
Mr. A lends $20,000 to Mr. B on May 6, 2009. A promissory note is written by Mr. B at a simple interest rate of 9%, with a due date of October 6, 2009. The maturity value of the note is $20,769.32.

5. The note was sold by Mr. A on June 26, 2009 to Mr. C who discounts the note at a simple discount rate of 8%. What price does Mr. A receive for the note?

   (A) $20,291.34 (B) $20,302.09 (C) $20,305.00 (D) $20,315.15

6. Mr. C sells the note to a Bank on August 6, 2009 for $20,419.16. What rate of return does the Bank earn on their investment?

   (A) 10.26% (B) 11.71% (C) 9.83% (D) 11.95%

7. A debt of $60,000 is to be paid off by installments of $20,000 in 20 days, $1500 in 60 days and a final payment of $$X$ in 85 days. If simple interest is charged at $r = 16\%$ and the Declining Balance Method is used, what is X?

   (A) $40,149.32 (B) $40,172.09 (C) $40,180.74 (D) $41,585.76

8. What is the nominal rate of interest convertible quarterly at which the discounted value (present value) of $15,000 due at the end of 186 months is $5000?

   (A) 9.56% (B) 7.39% (C) 7.27% (D) 7.15%

9. A non-interest bearing long term promissory note is due on February 1, 2010. The loan amount was $30,000. On October 15th, 2009 the note was sold to a bank that charges interest at $j_{12} = 12\%$. How much did the bank pay for this note? Assume the practical (or approximate) method is used for fractional time periods.

   (A) $28,962.10 (B) $28,952.61 (C) $28,829.41 (D) $28,675.35

10. What is the equivalent effective annual rate, j, over 8-years that is equivalent to $j_6 = 8\%$ for the first three years, $j_{12} = 6\%$ for the next three years, and $j_2 = 5\%$ for the last two years?

(A) 6.02% (B) 6.13% (C) 6.50% (D) 6.67%

11. You are given that at a certain rate j_1, money will double itself in 12-years. At this same rate j_1, how many years will it take for \$1500 to accumulate \$700 of interest?

(A) 8.2 years (B) 6.6 years (C) 5.6 years (D) 4.2 years

12. A \$1000 loan is taken out. The loan is repaid with a payment of \$400 at the end of the 1st year, \$800 at the end of the 5th year, and a payment of \$$X$ at the end of the 10th year. If $j_4 = 12\%$, what is X?

(A) \$220.97 (B) \$657.84 (C) \$737.26 (D) \$1406.54

13. A single deposit of \$25,000 is made into an account that earns interest at $j_4 = 7\%$ for one year, $j_2 = 6\%$ for the next year and $j_6 = 3\%$ thereafter. How much interest is earned in the <u>fourth year</u>?

(A) \$143.93 (B) \$863.58 (C) \$889.82 (D) \$916.85

14. You borrow \$2500 today. The loan is due in 5-years, with interest at $j_2 = 8\%$. It is agreed that you can instead pay \$$X$ two years from now and \$1500 three years from now. If money is worth $j_{12} = 6\%$, what is the value of X?

(A) \$1679.54 (B) \$1537.81 (C) \$1405.04 (D) \$675.25

15. Population growth in a given urban city was 4% for the calendar years 2001 to 2005 inclusive and 3% for the calendar years 2006 to 2008 inclusive. If the population of this city was 664,735 on December 31, 2008, what was the population of this city on December 31, 2000?

(A) 500,000 (B) 512,193 (C) 515,000 (D) 520,000

16. You borrow \$$A$ on September 28, 2009 at $j_{12} = 6\%$. You repay the loan with monthly payments of \$250 starting October 28, 2009 and ending on October 28, 2012. What is the value of A?

(A) \$10,133.20 (B) \$9834.03 (C) \$8425.63 (D) \$8217.75

17. You can buy a car with 60-monthly payments of \$350, first payment made today. If $j_{12} = 3\%$, what is the equivalent cash price of the car, payable today?

(A) \$19,478.33 (B) \$19,527.02 (C) \$19,828.33 (D) \$20,947.63

18. Mrs. Smith makes 20 annual deposits of \$2000 into a retirement savings account, first deposit made today. If she earns $j_1 = 5\%$ on her money, how much does she have 25 years from today?

(A) \$95,454.20 (B) \$88,623.08 (C) \$84,402.94 (D) \$66,131.91

19. You make n-deposits of \$$R$ into an account that earns i per period. One period after the n^{th} deposit, you have accumulated \$17,000. What is R?
You are given: $s_{\overline{n-1}|i} = 28.13238$, $s_{\overline{n}|i} = 30.53900$, $s_{\overline{n+1}|i} = 33.06596$

(A) \$583.54 (B) \$556.67 (C) \$539.02 (D) \$530.16

20. Jim buys some furniture for \$3850. He pays \$200 down and repays the rest with 24 monthly payments of \$$R$, first payment due 3 months from today. If $j_{12} = 9\%$, what is R?

(A) \$169.26 (B) \$170.53 (C) \$178.53 (D) \$179.87

21. Deposits of \$2000 are made every 6-months for 6-years in a fund that pays interest at $j_2 = 8\%$. Just after the 12th deposit, the interest rate changes to $j_4 = 8\%$ and quarterly deposits of \$1000 are now made, first deposit 3 months after the interest rate change. How much is in the fund immediately after the 20th deposit of \$1000?

(A) \$54,348.98 (B) \$68,495.94 (C) \$68,781.09 (D) \$68,952.48

22. Sally deposits \$$R$ every 3-months for 20 years (80 deposits in total), first deposit made <u>today</u>. The deposits earn $j_4 = 6\%$. Three months after her last deposit, Sally withdraws the accumulated amount of her deposits and invests it in a retirement fund that pays interest at $j_4 = 4\%$. From this fund she can make quarterly withdrawals of \$3000, first withdrawal in 3-months, for 15-years (60 withdrawals in total). Which of the following equations will give the correct value of R?

(A) $R\, s_{\overline{80}|0.015} = 3000\, a_{\overline{60}|0.01}$ (B) $R\, s_{\overline{80}|0.015} = 3000\, \ddot{a}_{\overline{60}|0.01}$

(C) $R\, \ddot{s}_{\overline{80}|0.015} = 3000\, a_{\overline{60}|0.01}$ (D) $R\, \ddot{s}_{\overline{80}|0.015} = 3000\, \ddot{a}_{\overline{60}|0.01}$