1. The present value of a perpetuity is $9.25. The perpetuity pays $1 at the end of every 2 years (that is to say, one payment every other year), with the first payment due immediately. Cheryl will make 3 payments of $300 each. The first payment is due one year from now, with successive payments due every third year thereafter. Determine the present value of Cheryl's payments at the same annual effective interest rate used to determine the present value of the perpetuity described above.
   (A) Less than $725
   (B) At least $725, but less than $740
   (C) At least $740, but less than $755
   (D) At least $755, but less than $770
   (E) $770 or more
   [CAS 11/97 #2]

2. Norma receives $500,000 from a life insurance policy with which she purchases an annuity-certain. The annuity will pay 10 equal annual installments, with the first payment made immediately. On the day she receives her fourth payment she is offered, in lieu of the future annual payments, a new payment scheme:
   (i) 4 annual payments of $40,000, beginning in one year, followed by a monthly perpetuity of X
   (ii) The first monthly perpetuity payment would occur one month after the fourth annual payment of $40,000
   The effective annual rate of interest is 9% for the entire time period. Determine the value of X
   (A) Less than $1,500
   (B) At least $1,500, but less than $1,700
   (C) At least $1,700, but less than $1,900
   (D) At least $1,900, but less than $2,100
   (E) At least $2,100
   [CAS 5/95 #11]

3. A car dealer offers to sell a car for 10,000. The current market loan rate is a nominal rate of interest of 12% per annum, compounded monthly. As an inducement, the dealer offers 100% financing at an effective annual interest rate of 5%. The loan is to be repaid in equal installments at the end of each month over a four-year period. Calculate the cost to the dealer of this inducement.
   (A) 700 (B) 900 (C) 1100 (D) 1300 (E) 1500
   [SOA 5/87 #4]

4. A perpetuity of $1 each year, with the first payment due immediately, has a present value of $25 at an annual effective rate of i%. The owner exchanges it for another perpetuity with the first payment due immediately and subsequent payments due at two year intervals.
What should the payment of the second perpetuity be, in order to keep the same interest rate, i%, and the same present value?
(A) Less than $1.90
(B) At least $1.90, but less than $1.94
(C) At least $1.94, but less than $1.98
(D) At least $1.98, but less than $2.02
(E) $2.02 or more
[CAS 5/84 #1]

5. You invest in the Esmerelda Corporation by loaning them a certain amount of money, L. They agree to pay you interest each year of $100, payable continuously. Esmerelda Corporation must extinguish the debt by making a single payment of $1,000 is paid. You desire at least a 12% rate of return on your investment. Determine the largest amount L can be.
(B) Less than $915
(C) At least $915, but less than $925
(D) At least $925, but less than $935
(E) At least $935, but less than $945
(F) $945 or more
[CAS 11/96 #11]

6. For points in time x>0, a discount function is defined as follows:
\[ [a(x)]^{-1} = \frac{1}{1 + 0.01^x} \]
A five year annuity has payments of 1 at times x=1,2,3,4 and 5. To calculate the present value of the annuity, a student first accumulates the payments according to the following accumulation function, where t is the length of the accumulation period:
\[ a(t) = 1 + 0.01^t \]
The student then multiplies the result by \([a(5)]^{-1}\). By how much does the student’s calculated value exceed the correct value of the annuity at time x=0?
(A) -.0494 (B) -.0018 (C) 0 (D) .0018 (E) .0494
[SOA SAMPLE/84 #17]

7. Francois purchases a 10-year annuity-immediate with annual payments of 10X. Jacques purchases a 10-year decreasing annuity-immediate which also makes annual payments. The payment at the end of year 1 is equal to 50. At the end of year 2, and at the end of each year through year 10, each subsequent payment is reduced over what was paid in the previous year by an amount equal to X. At an annual effective interest rate of 7.072%, both annuities have the same present value. Calculate X, where X<5
(A) 3.29 (B) 3.39 (C) 3.49 (D) 3.59 (E) 3.69
[SOA 5/98 #6]

Answer: ADDCB DD