

Name: ANSWER KEY

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN
Actuarial Science Program
DEPARTMENT OF MATHEMATICS

Math 370 (Z)
Exam 2/FM Preparation

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Fall 2007

Basic Annuities and Perpetuities
Summary Quiz

- 1) You deposit \$100 into an account, earning 12% effective, at the beginning of each year for 20 years. At what date is your accumulated account valued at \$9,038.26?

- (A) Immediately after the last deposit.
(B) One year after the last deposit.
(C) Two years after the last deposit.
(D) Three years after the last deposit.
(E) Four years after the last deposit.

$$100 \cdot s_{\overline{20}|.12} = 7205.24 \text{ @ LAST DEP.}$$

$$7205.24 (1.12)^2 = 9038.26$$

⇒ 2 YRS. AFTER LAST DEPOSIT.

- 2) A financial agreement will pay you the following cash flows t years from now:

\$50 on $t = 1, 2, 3, \dots, 10$ $PV = 50 \cdot a_{\overline{10}|.08} + 75 \cdot a_{\overline{10}|.08} \cdot v_{.08}^{10} = 568.61$
\$75 on $t = 11, 12, 13, \dots, 20$

OR $50 \cdot a_{\overline{20}|.08} + 25 \cdot a_{\overline{10}|.08} \cdot v_{.08}^{10} = 568.61$

Calculate the present value of these 20 payments, assuming an annual effective interest rate of 8%.

OR $75 \cdot a_{\overline{20}|.08} - 25 \cdot a_{\overline{10}|.08} = \underline{\underline{568.61}}$

- (A) \$517 (B) \$532 (C) \$551 (D) \$569 (E) \$583

- 3) A perpetuity pays \$100 at the end of every calendar quarter, with the first payment occurring six months from now. The nominal interest rate is 10% convertible quarterly. Calculate the present value of this perpetuity.

$$PV = \left(\frac{100}{.025} \right) \cdot v_{.025}^1 = \underline{\underline{3902.44}}$$

- (A) \$3,800 (B) \$3,900 (C) \$4,000 (D) \$4,100 (E) \$4,200

- 4) You receive payments from a perpetuity that makes annual payments of \$90, with the first payment occurring one year from now. The present value of the perpetuity is \$2,000 at effective annual interest rate i . Suppose you deposit the perpetuity payments into an account earning an annual effective rate of $1.50i$. Calculate the accumulated value in the account immediately after the 5th deposit.

$$i = \frac{90}{2000} = .045 \quad 1.50i = j = .0675$$

- (A) \$515 (B) \$520 (C) \$525 (D) \$530 (E) \$535

$$90 \cdot s_{\overline{5}|.0675} = \underline{\underline{514.99}}$$