

MAP 4170
Test 1

Name: _____
Date: June 1, 2017

Show sufficient work and clearly mark your answers. Each problem is worth 10 points.

1. A deposit of 500 accumulates to 625 after 2.5 years using a simple interest rate i . Determine the accumulated value after 2.5 years if 500 is deposited into an account that earns an annual effective interest rate of i .

(A) 615

(B) 620

(C) 625

(D) 630

(E) 635

2. A deposit of X accumulates to 1000 after 6 years. During the first two years, interest is credited using a simple discount rate of 6%. During the second two-year period, interest is credited using a nominal interest rate of 6% compounded bi-annually. During the third two-year period, interest is credited using a force of interest $\delta = 6\%$. Determine X .

(A) 697

(B) 700

(C) 702

(D) 705

(E) 707

3. Given a simple interest rate of 5%, determine the equivalent nominal discount rate, compounded semi-annually, for the second half of the first year.
- (A) 1.8%
 - (B) 2.4%
 - (C) 3.6%
 - (D) 4.8%
 - (E) 7.2%
4. Using an interest rate of i compounded monthly, a payment of 5000 at the end of two years together with a payment of 10,000 at the end of four years have a total present value of 9375. Using the same interest rate, a deposit of 27,000 accumulates to Y after six years. Determine Y .
- (A) 36,000
 - (B) 48,000
 - (C) 64,000
 - (D) 72,000
 - (E) 81,000

5. An account credits interest using $\delta_t = k \cdot \frac{t}{t^2+2}$ where t is the number of years after January 1, 2017. A deposit of X made on January 1, 2017, accumulates to $3X$ on January 1, 2021. Determine the accumulated value of this deposit on July 1, 2019.
- (A) $2.01X$
- (B) $2.03X$
- (C) $2.05X$
- (D) $2.07X$
- (E) $2.09X$
6. An account credits interest using a simple interest rate of 5%. Determine i_5 , the annual effective interest rate for year 5.
- (A) 4.2%
- (B) 4.3%
- (C) 4.4%
- (D) 4.5%
- (E) 4.6%

7. A single deposit of X is made into an account that credits interest using a simple discount rate of d over a 10-year period. At the end of 3 years, the amount in the account is 1000, whereas at the end of 5 years, the amount in the account is 1100. Calculate d .
- (A) 2%
- (B) 3%
- (C) 4%
- (D) 5%
- (E) 6%
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8. A deposit of 1000 is made into account A, which credits interest using a simple interest rate of 12%. At the same time, a deposit of 1000 is made into account B, which credits interest using a quarterly effective discount rate of 2%. Let T denote the time at which the forces of interest in the two accounts are equal. If α and β denote the amounts in accounts A and B, respectively, at time T , determine $\alpha - \beta$.
- (A) -100
- (B) -50
- (C) 0
- (D) 50
- (E) 100

9. Determine $\frac{d}{dv}(v^2)$.

(A) $2v$

(B) $-2v$

(C) $2v^3$

(D) $-2v^3$

(E) none of the above

10. Given a nominal interest rate of i , converted semiannually, let d denote the equivalent nominal discount rate, converted semiannually. Determine d in terms of i .

(A) $d = \frac{i}{1+i}$

(B) $d = \frac{2i}{1+i}$

(C) $d = \frac{2i}{1+2i}$

(D) $d = \frac{2i}{2+i}$

(E) none of the above