

1. Solution: C

Given the same principal invested for the same period of time yields the same accumulated value, the two measures of interest $i^{(2)} = 0.04$ and δ must be equivalent, which means:

$$\left(1 + \frac{i^{(2)}}{2}\right)^2 = e^\delta \text{ over a one-year period. Thus,}$$

$$e^\delta = \left(1 + \frac{i^{(2)}}{2}\right)^2 = 1.02^2 = 1.0404$$

$$\delta = \ln(1.0404) = 0.0396.$$

3. Solution: C

Eric's (compound) interest in the last 6 months of the 8th year is $100\left(1 + \frac{i}{2}\right)^{15} \frac{i}{2}$.

Mike's (simple) interest for the same period is $200\frac{i}{2}$.

Thus,

$$100\left(1 + \frac{i}{2}\right)^{15} \frac{i}{2} = 200\frac{i}{2}$$

$$\left(1 + \frac{i}{2}\right)^{15} = 2$$

$$1 + \frac{i}{2} = 1.047294$$

$$i = 0.09459 = 9.46\%.$$

9. Solution: C

Equation of value at end of 30 years:

$$10(1 - d/4)^{-40}(1.03)^{40} + 20(1.03)^{30} = 100$$

$$10(1 - d/4)^{-40} = [100 - 20(1.03)^{30}] / 1.03^{40} = 15.7738$$

$$1 - d/4 = 1.57738^{-1/40} = 0.98867$$

$$d = 4(1 - 0.98867) = 0.0453 = 4.53\%.$$

10. Solution: E

The accumulation function is $a(t) = \exp\left[\int_0^t (s^2 / 100) ds\right] = \exp(t^3 / 300)$.

The accumulated value of 100 at time 3 is $100 \exp(3^3 / 300) = 109.41743$.

The amount of interest earned from time 3 to time 6 equals the accumulated value at time 6 minus the accumulated value at time 3. Thus

$$(109.41743 + X)[a(6) / a(3) - 1] = X$$

$$(109.41743 + X)(2.0544332 / 1.0941743 - 1) = X$$

$$(109.41743 + X)0.877613 = X$$

$$96.026159 = 0.122387X$$

$$X = 784.61.$$