M329F: February 17th, 2020.

* 195.

Porter makes three-year loans that include inflation protection. The annual interest rate compounded continuously that must be paid is 3.2% plus the rate of inflation. basis for the force of interest

The U.S. government borrows 100,000 for three years from Porter. The actual annual inflation rate during the first year was 2.4% compounded continuously. The actual annual inflation rates for the second and third years respectively was 2.8% and 4.2% compounded continuously.

The U.S. government is considered a risk free borrower, which means there is no chance of default.

Calculate the amount that the U.S. government will owe Porter at the end of three years.

A. 120,560

B. 120,740

C. 120,925

D. 121,125

E. 122,250

In year 1: $0.032 + 0.024 = 0.056$;

In year 2: $0.032 + 0.028 = 0.06$;

In year 3: $0.032 + 0.042 = 0.074$.

$$100{,}000\, e^{0.056} \cdot e^{0.06} \cdot e^{0.074} =$$

$$= 120.924.96 \Rightarrow (C)$$

196.

Katarina has borrowed 300,000 from Trout Bank. Katarina will repay 100,000 of principal at the end of each of the first three years.

Katarina will pay Trout Bank a variable interest rate equal to the one year spot interest rate at the beginning of each year.

Katarina would like to have a fixed interest rate so she enters into an interest rate swap with Lily. Under the interest rate swap, Katarina will pay a fixed rate to Lily, and Lily will pay a variable rate to Katarina. The variable rate will be the same rate that Katarina is paying to Trout Bank. The other terms of the swap will mirror the loan that Katarina has.

Which of the following statements is true?

A. This is an accreting swap.

B. The settlement period for the swap is three years.

C. The notional amount for this swap is 300,000.

D. Katarina and Trout Bank are counterparties to the swap.

E. Lily is the receiver under the swap.

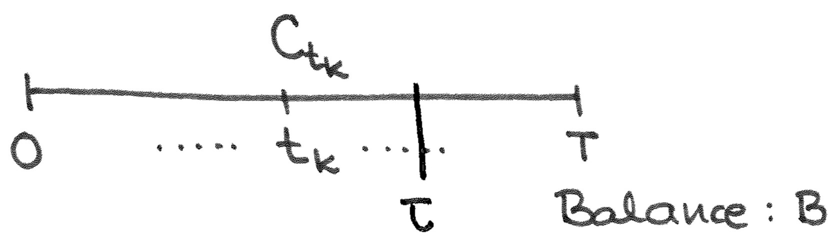
1.

Task to do @ home:

Slides on Section 2.2.

Equations of Value: Special case

COMPOUND INTEREST:
the accumulation f'tion is $a(t) = (1+i)^t$



At time T, our equation of value is:

$$\sum_k C_{t_k} (1+i)^{T-t_k} = B$$

At time 0, the eq'n of value is:

$$\sum_k C_{t_k} \cdot \frac{1}{a(t_k)} =$$

$$= \sum_k C_{t_k} \cdot \frac{1}{(1+i)^{t_k}} = \sum_k C_{t_k} \cdot v^{t_k}$$

$$v = \frac{1}{1+i}$$

$$\Rightarrow \quad \sum_k C_{t_k} \cdot v^{t_k} = B v^T$$

At time τ, the eq'n of value:

$$\sum_k C_{t_k} (1+i)^{\tau - t_k} = B(1+i)^{\tau - T}$$