EXAM FM QUESTIONS OF THE WEEK

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Week of February 4/08

Smith borrows $50,000 from Brown and another $50,000 from Jones.

Smith repays the loan to Brown over a 10 year period by annual payments based on the sinking fund method. Brown receives annual interest at the end of each year at an annual rate of 8% and then receives the $50,000 principal amount of the loan at the end of 10 years along with the final interest payment. The interest rate on the sinking fund account is an annual effective rate of 4%. Smith makes level annual deposits at the end of each year to the sinking fund.

Smith repays the loan to Jones with level annual payments at the end of each year for 10 years based on an annual effective interest rate of i.

If the two payment streams made by Smith are combined, Smith determines that the average annual effective interest rate he is paying during the 10 year period for the two loans combined is 10%.

Find i.

The solution can be found below.

Week of February 4/08 - Solution

Smith's interest payment to Brown is $4000 each year for 10 years.

Smith's annual deposits to the sinking fund are $\dfrac{50,000}{s_{\overline{10}|.04}} = 4164.55$.

Suppose that Smith's annual payments to Jones are K.

Then $100,000 = (4000 + 4164.55 + K) \cdot a_{\overline{10}|.10}$,

and therefore, $K = 8109.99$.

For Smith's loan from Brown, we have $50,000 = 8109.99 \cdot a_{\overline{10}|i}$

and solving for i from a calculator results in $i = 9.92\%$.