EXAM FM QUESTIONS OF THE WEEK

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Question 6 - Week of August 29

A loan of amount $50,000 is made on January 1, 2000, with payments to be made every December 31 according to the following schedule:

Repayment schedule:

Years	Repayment Amounts
2000-2004	$5,000
2005-2006	$0
2007	$15,000
2008-2013	$5,000
2014	Balance of loan

The interest rate is 7% per year, compounded annually.

In what range is the amount of interest included in the repayment to be made in 2009?

A) Less than $2100 B) At least $2100 but less than $2200

C) At least $2200 but less than $2300 D) At least $2300 but less than $2400

E) At least $2300

The solution can be found below.

Question 6 Solution

Solution: The payment on 12/31/2009 is the 10th payment. We can find the interest in the 10th payment as $I_{10} = OB_9 \times i$. The outstanding balance just after the 9th payment (12/31/2008) can be found retrospectively. The following diagram illustrates this.

End of	00	01 ⋯	04	05	06	07	08
Pmt.# 0	1	2 ⋯	5	6	7	8	9
Pmt. Amount (1000's)	5	5 ⋯	5	0	0	15	5

The retrospective outstanding balance is found by accumulating the original loan to the valuation point and then subtracting the accumulated payments already made. This is $50,000(1.07)^9 - 5000s_{\overline{5}|} \cdot (1.07)^4 - 15000(1.07) - 5000 = 33,183$.

Then $I_{10} = 33,183 \times .07 = 2323$.

Note that we could have found the final loan balance payment made on 12/31/2012 and then find OB_9 prospectively, but this was not necessary since the original loan amount and payments were given. Answer: D