May 2003 SOA/CAS Course 2 Examination, Problem No. 36, also Study Note FM-09-05, Problem No. 38

Eric and Jason each sell a different stock short at the beginning of the year for a price of 800. The margin requirement for each investor is 50% and each will earn an annual effective interest rate of 8% on his margin account. Each stock pays a dividend of 16 at the end of the year. Immediately thereafter, Eric buys back his stock at a price of \((800 - 2X)\), and Jason buys back his stock at a price of \((800 + X)\). Eric’s annual effective yield, \(i\), on the short sale is twice Jason’s annual effective yield. Calculate \(i\).

A. 40%  
B. 6%  
C. 8%  
D. 10%  
E. 12%

Solution.
Margin deposit (initial cash outlay) = 400 for both Eric and Jason. We have:

Eric’s net result = \(\frac{2X}{800-(800-2X)} + \frac{32}{8\% \cdot (800)} - \frac{16}{8\% \cdot (800)} = 16 + 2X\),

and

Jason’s net result = \(-X + 32 - 16 = 16 - X\).

Thus, by comparing yields

\[ i = \frac{16 + 2X}{400} = 2 \left( \frac{16 - X}{400} \right), \]

and from this we conclude that \(X = 4\). Eric’s yield is

\[ i = \frac{16 + 2 \cdot 4}{400} = 6\%. \]

Answer B.

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