Since the notional amount is constant, we can use the formula

\[ i = \frac{1 - (V_5)^5}{V_1 + V_2^2 + V_3^3 + V_4^4 + V_5^5} \]

\[ V_1 = \frac{1}{1.04} \quad \Box \]

\[ V_2^2 = \frac{1}{1.045^2} \quad \Box \]

\[ V_3^3 = 1.0525^{-3} \quad \Box \]

\[ V_4^4 = 1.0625^{-4} \quad \Box \]

\[ V_5^5 = 1.075^{-5} \quad \Box \]

\[ \therefore i = \frac{1 - \Box}{\Box + \Box + \Box + \Box + \Box} = 0.07197 \ldots \]
For year 2, LIBOR = .04

For the debt, ABC's payment = 2000000(0.04) = 90000

Now consider the swap. The net swap payment is

2000000 (.04 - .03) = 20000

So ABC receives (since positive) 20000.

.\ the net interest payment = 90000 - 20000

= 70,000
157) The reinsurance company is the receiver. It receives the fixed payments.

For year 1, LIBOR = .01

:. the company pays $2,000,000 (0.015) = 30,000

The swap spread is +0.29% on the 2% rate.

:. the fixed interest rate is .02 + .002 = .022

:. the company receives $2,000,000 (0.022) = 44,000

The net swap payment is 44,000 - 30,000 = 14,000.
Since no notional amount is given, assume it's constant.

\[
(i) \quad (i) \quad (i)
\]

\[
f_{[3,3]} \cdot \nu_3^3 = \nu_2^2 - \nu_3^3
\]

\[
f_{[3,4]} \cdot \nu_4^4 = \nu_3^3 - \nu_4^4
\]

\[
f_{[4,5]} \cdot \nu_5^5 = \nu_4^4 - \nu_5^5
\]

\[
= \nu_2^2 - \nu_5^5
\]

\[
\therefore \quad i = \frac{\nu_2^2 - \nu_5^5}{\nu_3^3 + \nu_4^4 + \nu_5^5}
\]

\[
\nu_2^2 = (1.031)^{-2} \quad \Box
\]

\[
\nu_3^3 = (1.034)^{-3} \quad \Box
\]

\[
\nu_4^4 = (1.036)^{-4} \quad \Box
\]

\[
\nu_5^5 = (1.04)^{-5} \quad \Box
\]

\[
i = \frac{2 - 5}{3 + 4 + 5} = 0.0458\ldots
\]
See SOA solution.

Katrina pays a fixed rate to Lily under the swap.

... Katrina is the payer under the swap.

Equivalently, Lily receives a fixed rate from Katrina under the swap.

... Lily is the receiver under the swap.
This is an amortizing swap

\[
\begin{align*}
300000 f_{[0,1]} & \quad (300000 i) \\
200000 f_{[1,2]} & \quad (200000 i) \\
100000 f_{[2,3]} & \quad (100000 i)
\end{align*}
\]

\[
\begin{array}{cccc}
0 & 1 & 2 & 3 \\
\hline
300000 f_{[0,1]} & \quad (300000 i) & \quad (200000 i) & \quad (100000 i)
\end{array}
\]

Set the 2 PV's equal, and solve for \( i \)

\[
\begin{align*}
\therefore 300000 i \cdot v_1 + 200000 i \cdot v_2^2 + 100000 i \cdot v_3^3 &= 0 \\
300000 f_{[0,1]} \cdot v_1 + 200000 f_{[1,2]} \cdot v_2^2 + 100000 f_{[2,3]} \cdot v_3^3 &= 0 \\
= 1 - v_1 & = v_1 - v_2^2 & = v_2^2 - v_3^3
\end{align*}
\]

\[
\begin{align*}
\therefore i &= \frac{300000 (1 - v_1) + 200000 (v_1 - v_2^2) + 100000 (v_2^2 - v_3^3)}{300000 v_1 + 200000 v_2^2 + 100000 v_3^3}
\end{align*}
\]

\[
\begin{align*}
v_1 &= (1.043)^{-1} & v_2 &= (1.045)^{10} & v_3 &= (1.051)^{-3}
\end{align*}
\]

\[
\therefore i = .047777\ldots
\]
\( i = \frac{v_2^2 - v_5^5}{v_3^3 + v_4^4 + v_5^5} \)

\( v_2^2 = (1.046)^2 \)
\( v_3^3 = (1.051)^3 \)
\( v_4^4 = (1.054)^4 \)
\( v_5^5 = (1.056)^5 \)

\( \therefore i = 0.06265 \ldots \)
Minozi is the receiver under the swap; the timeline for Minozi is

\[
\begin{align*}
&5/5/15 & 5/5/17 \\
\end{align*}
\]

\[
\begin{align*}
250000i & \quad (250000 \tilde{f}_{E0,12}) \\
250000i & \quad (250000 \tilde{f}_{E1,23}) \\
\end{align*}
\]

\[
MV_2 = 250000i (\tilde{\nu}_1 + \tilde{\nu}_2^2) - 250000 \left[ \tilde{f}_{E0,12} \cdot \tilde{\nu}_1 + \tilde{f}_{E1,23} \cdot \tilde{\nu}_2^2 \right] \\
= 1 - \tilde{\nu}_1 \\
= \tilde{\nu}_1 - \tilde{\nu}_2^2
\]

\[
\therefore MV_2 = 250000 \left[ i (\tilde{\nu}_1 + \tilde{\nu}_2^2) - (1 - \tilde{\nu}_2^2) \right]
\]

\[
i = 0.4 \quad \tilde{\nu}_1 = (1.038)^{-1} \quad \tilde{\nu}_2 = (1.041)^2
\]

\[
\therefore MV_2 = 443.085
\]

Remark: The negative indicates that Minozi would have to pay 443 in order to get out of the swap.
200) SOA is the payer under the swap.

\[ i = 0.0535 = \text{swap rate} \]

For year 3, \( \text{LIBOR} = 0.056 \)

\[ \therefore \text{SOA pays Bailey Bank} \ 500,000 \times (0.056 + 0.012) = 34,000 \]

For the swap, the net swap payment is

\[ 500,000 \times (0.056 + 0.005) - 500,000 \times (0.0535) = 3750 \]

\[ \therefore \text{SOA receives} \ 3750 \text{ from the counterparty under the swap} \]

\[ \therefore \text{net interest payment is} \ 34,000 - 3750 = 30,250 \]
\[ i = \frac{1 - v_4^4}{v_1 + v_2^2 + v_3^3 + v_4^4} \]

\[ v_1 = (1.015)^{-1/4} \]

\[ v_2 = (1.0165)^{-1/2} \]

\[ v_3 = (1.0179)^{-3/5} \]

\[ v_4 = (1.0192)^{-1} \]

\[ \therefore i = 0.00478 \ldots \text{geir} \]
202) Since the notional amount is constant, the swap rate is

\[ i = \frac{1 - v^4}{v_1 + v_2^2 + v_3^3 + v_4^4} \]

From the data, \( v_1 = .965 \), \( v_2^2 = .92 \), \( v_3^3 = .875 \), and \( v_4^4 = .825 \).

\[ i = \frac{1 - .825}{.965 + .92 + .875 + .825} = .0488... \]

Josh is the payer under the swap. His net swap payment at the end of the first year is

\[ 200000 \left( f_{0,1} - i \right) \]

\[ f_{0,1} = v^{-1}_1 - 1 = .036... \]

\[ \therefore \text{net swap payment} = 200000 \left( .036... - .048... \right) \]

\[ = -2509 \]

\[ \therefore \text{Josh pays} 2509 \text{ to Phillip} \]