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In[1]:= R1 = {{1, 0, 0}, {0, Cos[θ1], Sin[θ1]}, {0, -Sin[θ1], Cos[θ1]}};
R2 = {{Cos[θ2], 0, -Sin[θ2]}, {0, 1, 0}, {Sin[θ2], 0, Cos[θ2]}};
R3 = {{Cos[θ3], Sin[θ3], 0}, {-Sin[θ3], Cos[θ3], 0}, {0, 0, 1}};
R1 // MatrixForm
R2 // MatrixForm
R3 // MatrixForm

```

Out[4]//MatrixForm=

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & \cos[\theta_1] & \sin[\theta_1] \\ 0 & -\sin[\theta_1] & \cos[\theta_1] \end{pmatrix}$$

Out[5]//MatrixForm=

$$\begin{pmatrix} \cos[\theta_2] & 0 & -\sin[\theta_2] \\ 0 & 1 & 0 \\ \sin[\theta_2] & 0 & \cos[\theta_2] \end{pmatrix}$$

Out[6]//MatrixForm=

$$\begin{pmatrix} \cos[\theta_3] & \sin[\theta_3] & 0 \\ -\sin[\theta_3] & \cos[\theta_3] & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

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In[ ]:= A2 = R1.R2.R3;
FullSimplify[A2] // MatrixForm

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Out[]//MatrixForm=

$$\begin{pmatrix} \cos[\theta_2] \cos[\theta_3] & \cos[\theta_2] \sin[\theta_3] & -\sin[\theta_2] \\ \cos[\theta_3] \sin[\theta_1] \sin[\theta_2] - \cos[\theta_1] \sin[\theta_3] & \cos[\theta_1] \cos[\theta_3] + \sin[\theta_1] \sin[\theta_2] \sin[\theta_3] & \cos[\theta_2] \sin[\theta_1] \\ \cos[\theta_1] \cos[\theta_3] \sin[\theta_2] + \sin[\theta_1] \sin[\theta_3] & -\cos[\theta_3] \sin[\theta_1] + \cos[\theta_1] \sin[\theta_2] \sin[\theta_3] & \cos[\theta_1] \cos[\theta_2] \end{pmatrix}$$

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In[ ]:= B2 = Inverse[A2];
FullSimplify[B2] // MatrixForm

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Out[]//MatrixForm=

$$\begin{pmatrix} \cos[\theta_2] \cos[\theta_3] & \cos[\theta_3] \sin[\theta_1] \sin[\theta_2] - \cos[\theta_1] \sin[\theta_3] & \cos[\theta_1] \cos[\theta_3] \sin[\theta_2] + \sin[\theta_1] \sin[\theta_3] \\ \cos[\theta_2] \sin[\theta_3] & \cos[\theta_1] \cos[\theta_3] + \sin[\theta_1] \sin[\theta_2] \sin[\theta_3] & -\cos[\theta_3] \sin[\theta_1] + \cos[\theta_1] \sin[\theta_2] \sin[\theta_3] \\ -\sin[\theta_2] & \cos[\theta_2] \sin[\theta_1] & \cos[\theta_1] \cos[\theta_2] \end{pmatrix}$$