(Alt) In[•]:=
$$\text{Simplify}\left[\text{Inverse}\left[\begin{pmatrix}1&0\\0&1\end{pmatrix}-\begin{pmatrix}a_{11}&a_{12}\\a_{21}&a_{22}\end{pmatrix}\right]\right]==\begin{pmatrix}\frac{1}{1-\left(a_{11}+a_{12}\frac{1}{1-a_{22}}a_{21}\right)}&\frac{1}{1-a_{11}}a_{12}\frac{1}{1-\left(a_{22}+a_{21}\frac{1}{1-a_{11}}a_{12}\right)}\\\frac{1}{1-a_{22}}a_{21}\frac{1}{1-\left(a_{11}+a_{12}\frac{1}{1-a_{22}}a_{21}\right)}&\frac{1}{1-\left(a_{22}+a_{21}\frac{1}{1-a_{11}}a_{12}\right)}\end{pmatrix}\Bigg]$$

(Alt) Out[•]= True

(Alt) In[•]:=
$$\text{Simplify}\left[\frac{1}{1-a_{11}}a_{12}\frac{1}{1-\left(a_{22}+a_{21}\frac{1}{1-a_{11}}a_{12}\right)}==\frac{1}{1-\left(a_{11}+a_{12}\frac{1}{1-a_{22}}a_{21}\right)}a_{12}\frac{1}{1-a_{22}}\right]$$

(Alt) Out[•]= True

(Alt) In[•]:=
$$\left\{\frac{1}{1-\frac{1}{1-x}},\frac{1}{1-\frac{x}{1-x}}\right\}\text{ // Simplify}$$

(Alt) Out[•]=
$$\left\{\frac{-1+x}{x},\frac{-1+x}{-1+2x}\right\}$$

(Alt) In[•]:=
```
PQR = PolynomialQuotientRemainder;
```

(Alt) In[•]:=
```
det = Det[B = IdentityMatrix[3] - (A = Table[a10 i+j, {i, 3}, {j, 3}])]
```

(Alt) Out[•]=
$$1-a_{11}-a_{12}a_{21}-a_{22}+a_{11}a_{22}-a_{13}a_{31}+a_{13}a_{22}a_{31}-a_{12}a_{23}a_{31}-a_{13}a_{21}a_{32}-a_{23}a_{32}+a_{11}a_{23}a_{32}-a_{33}+a_{11}a_{33}+a_{12}a_{21}a_{33}+a_{22}a_{33}-a_{11}a_{22}a_{33}$$

(Alt) In[•]:=
```
d1 = 1 - a11; PQR[det, d1, a11]
```

(Alt) Out[•]=
$$\{1-a_{22}-a_{23}a_{32}-a_{33}+a_{22}a_{33},\ -a_{12}a_{21}-a_{13}a_{31}+a_{13}a_{22}a_{31}-a_{12}a_{23}a_{31}-a_{13}a_{21}a_{32}+a_{12}a_{21}a_{33}\}$$

(Alt) In[•]:=
```
PQR[1 - a22 - a23 a32 - a33 + a22 a33, 1 - a22, a22]
```

(Alt) Out[•]=
$$\{1-a_{33},\ -a_{23}a_{32}\}$$

(Alt) In[•]:=
```
-a12 a21 - a13 a31 + a13 a22 a31 - a12 a23 a31 - a13 a21 a32 + a12 a21 a33 // Simplify
```

(Alt) Out[•]=
$$a_{13}\left(\left(-1+a_{22}\right)a_{31}-a_{21}a_{32}\right)+a_{12}\left(-a_{23}a_{31}+a_{21}\left(-1+a_{33}\right)\right)$$

(Alt) In[•]:=
```
Simplify[det == (1 - a11)
  (1 - a22 - a23 a32 - a33 + a22 a33 + (-a12 a21 - a13 a31 + a13 a22 a31 - a12 a23 a31 - a13 a21 a32 + a12 a21 a33)/(1 - a11))]
```

(Alt) Out[•]= True

(Alt) In[•]:=
```
Simplify[1/det == 1/((1 - a11) (1 - a22 - a23 a32 - a33 + a22 a33 + (-a12 a21 - a13 a31 + a13 a22 a31 - a12 a23 a31 - a13 a21 a32 + a12 a21 a33)/(1 - a11)))]
```

(Alt) Out[•]= True

(Alt) In[•]:=
$$\text{Simplify}\left[\frac{1}{\det} == \frac{1}{(1-a_{11})\left((1-a_{22})\left(1-a_{33}-\frac{a_{23}\,a_{32}}{1-a_{22}}\right)+\frac{-a_{12}\,a_{21}-a_{13}\,a_{31}+a_{13}\,a_{22}\,a_{31}-a_{12}\,a_{23}\,a_{31}-a_{13}\,a_{21}\,a_{32}+a_{12}\,a_{21}\,a_{33}}{1-a_{11}}\right)}\right]$$

(Alt) Out[•]= True

(Alt) In[•]:=
$$\text{Simplify}\left[\frac{1}{\det} == \frac{1}{(1-a_{11})\left(1-\left(a_{22}+a_{23}\,a_{32}+a_{33}-a_{22}\,a_{33}-\frac{-a_{12}\,a_{21}-a_{13}\,a_{31}+a_{13}\,a_{22}\,a_{31}-a_{12}\,a_{23}\,a_{31}-a_{13}\,a_{21}\,a_{32}+a_{12}\,a_{21}\,a_{33}}{1-a_{11}}\right)\right)}\right]$$

(Alt) Out[•]= True

(Alt) In[•]:=
$$\text{Simplify}\left[\frac{1}{\det} == \frac{1}{1-a_{11}}\,\frac{1}{1-\left(a_{22}+a_{23}\,a_{32}+a_{33}-a_{22}\,a_{33}-\frac{-a_{12}\,a_{21}-a_{13}\,a_{31}+a_{13}\,a_{22}\,a_{31}-a_{12}\,a_{23}\,a_{31}-a_{13}\,a_{21}\,a_{32}+a_{12}\,a_{21}\,a_{33}}{1-a_{11}}\right)}\right]$$

(Alt) Out[•]= True

(Alt) In[•]:= `i11 = Inverse[B][[1, 1]]`

(Alt) Out[•]=
$$(1-a_{22}-a_{23}\,a_{32}-a_{33}+a_{22}\,a_{33})\,/\,(1-a_{11}-a_{12}\,a_{21}-a_{22}+a_{11}\,a_{22}-a_{13}\,a_{31}+a_{13}\,a_{22}\,a_{31}-a_{12}\,a_{23}\,a_{31}-a_{13}\,a_{21}\,a_{32}-a_{23}\,a_{32}+a_{11}\,a_{23}\,a_{32}-a_{33}+a_{11}\,a_{33}+a_{12}\,a_{21}\,a_{33}+a_{22}\,a_{33}-a_{11}\,a_{22}\,a_{33})$$

(Alt) In[•]:=
$$\text{PQR}[1-a_{11}-a_{12}\,a_{21}-a_{22}+a_{11}\,a_{22}-a_{13}\,a_{31}+a_{13}\,a_{22}\,a_{31}-a_{12}\,a_{23}\,a_{31}-a_{13}\,a_{21}\,a_{32}-a_{23}\,a_{32}+a_{11}\,a_{23}\,a_{32}-a_{33}+a_{11}\,a_{33}+a_{12}\,a_{21}\,a_{33}+a_{22}\,a_{33}-a_{11}\,a_{22}\,a_{33},\ 1-a_{11},\ a_{11}]$$

(Alt) Out[•]=
$$\{1-a_{22}-a_{23}\,a_{32}-a_{33}+a_{22}\,a_{33},\ -a_{12}\,a_{21}-a_{13}\,a_{31}+a_{13}\,a_{22}\,a_{31}-a_{12}\,a_{23}\,a_{31}-a_{13}\,a_{21}\,a_{32}+a_{12}\,a_{21}\,a_{33}\}$$

(Alt) In[•]:=
$$\text{Simplify}\left[i11 == \frac{1}{1-a_{11}}\,\frac{1-a_{22}-a_{23}\,a_{32}-a_{33}+a_{22}\,a_{33}}{1-\left(a_{22}+a_{23}\,a_{32}+a_{33}-a_{22}\,a_{33}-\frac{-a_{12}\,a_{21}-a_{13}\,a_{31}+a_{13}\,a_{22}\,a_{31}-a_{12}\,a_{23}\,a_{31}-a_{13}\,a_{21}\,a_{32}+a_{12}\,a_{21}\,a_{33}}{1-a_{11}}\right)}\right]$$

(Alt) Out[•]= True

(Alt) In[•]:=
$$\text{Together}\left[a+f\,\frac{1}{c}\,g+\left(d+f\,\frac{1}{c}\,n\right)\,\frac{1}{\left(b+m\,\frac{1}{c}\,n\right)}\,\left(e+m\,\frac{1}{c}\,g\right)\right]$$

(Alt) Out[•]=
$$\frac{a\,b\,c^2+c^2\,d\,e+b\,c\,f\,g+c\,d\,g\,m+c\,e\,f\,n+a\,c\,m\,n+2\,f\,g\,m\,n}{c\,(b\,c+m\,n)}$$

(Alt) In[•]:=
$$\text{Simplify}\left[a+f\,\frac{1}{1-c}\,g+\left(d+f\,\frac{1}{1-c}\,n\right)\,\frac{1}{1-\left(b+m\,\frac{1}{1-c}\,n\right)}\,\left(e+m\,\frac{1}{1-c}\,g\right) == a+\frac{(1-c)\,d\,e+(1-b)\,f\,g+d\,g\,m+e\,f\,n}{(1-b)\,(1-c)-m\,n}\right]$$

(Alt) Out[•]= True

(Alt) In[•]:= $\text{Together}\left[a+f\frac{1}{1-c}g+\left(d+f\frac{1}{1-c}n\right)\frac{1}{1-\left(b+m\frac{1}{1-c}n\right)}\left(e+m\frac{1}{1-c}g\right)\right]$

(Alt) Out[•]= $\frac{a-a\,b-a\,c+a\,b\,c+d\,e-c\,d\,e+f\,g-b\,f\,g+d\,g\,m+e\,f\,n-a\,m\,n}{1-b-c+b\,c-m\,n}$

(Alt) In[•]:= $\text{Simplify}[d\,e-c\,d\,e+f\,g-b\,f\,g+d\,g\,m+e\,f\,n]$

(Alt) Out[•]= $d\,(e-c\,e+g\,m)+f\,(g-b\,g+e\,n)$

(Alt) In[•]:= $\text{Factor}\left[a+f\frac{1}{1-c}g+\left(d+f\frac{1}{1-c}n\right)\frac{1}{1-\left(b+m\frac{1}{1-c}n\right)}\left(e+m\frac{1}{1-c}g\right)\right]$

(Alt) Out[•]= $\frac{a-a\,b-a\,c+a\,b\,c+d\,e-c\,d\,e+f\,g-b\,f\,g+d\,g\,m+e\,f\,n-a\,m\,n}{1-b-c+b\,c-m\,n}$

(Alt) In[•]:= $\text{Factor}\left[\frac{1}{1-\left(b+m\frac{1}{1-c}n\right)}\right]$

(Alt) Out[•]= $-\frac{-1+c}{1-b-c+b\,c-m\,n}$

(Alt) In[•]:= $\text{Simplify}[1+b\,(-1+c)-c-m\,n==(1-b)\,(1-c)-m\,n]$

(Alt) Out[•]= True

(Alt) In[•]:= $\text{Simplify}[1-b-c+b\,c-m\,n]$

(Alt) Out[•]= $1+b\,(-1+c)-c-m\,n$

(Alt) In[•]:= $\text{Simplify}\left[f\frac{cc}{\omega}g+\left(d+f\frac{cc}{\omega}n\right)\frac{1}{1-\left(b+m\frac{cc}{\omega}n\right)}\left(e+m\frac{cc}{\omega}g\right)\right]$

(Alt) Out[•]= $-\frac{cc\,d\,g\,m+cc\,f\,(g-b\,g+e\,n)+d\,e\,\omega}{cc\,m\,n+(-1+b)\,\omega}$

(Alt) In[•]:= $\text{Simplify}\left[a+f\frac{1}{1-c}g+\left(d+f\frac{1}{1-c}n\right)\frac{1}{1-\left(b+m\frac{1}{1-c}n\right)}\left(e+m\frac{1}{1-c}g\right)==a+\frac{(1-c)\,d\,e+(1-b)\,f\,g+d\,g\,m+e\,f\,n}{(1-b)\,(1-c)-m\,n}\right]$

(Alt) In[•]:= $\text{FullSimplify}\left[\frac{1}{1-\left(d+c\frac{1}{1-a}b\right)}==\frac{1}{1-d}c\frac{1}{1-\left(a+b\frac{1}{1-d}c\right)}b\frac{1}{1-d}+\frac{1}{1-d}\right]$

(Alt) Out[•]= True

(Alt) In[•]:= $\partial_x \left(\frac{1}{1 - x} \right)$

(Alt) Out[•]= $\frac{1}{(1 - x)^2}$