

Pensieve header: $\det A = \exp \operatorname{tr} \log A$.

```
In[*]:= rdet[A_?MatrixQ] := Module[{n = Length@A},
  Normal[Series[Exp[Sum_{k=1}^n  $\frac{-\operatorname{Tr}[\operatorname{MatrixPower}[\operatorname{IdentityMatrix}@n - A, k]] \epsilon^k}{k}$ ], {epsilon, 0, n}]]
]
```

```
In[*]:= rdet[ $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ ]
```

```
Out[*]:=  $1 + (-2 + a + d) \epsilon + (1 - a - b c - d + a d) \epsilon^2$ 
```

```
In[*]:= Simplify[% /. epsilon -> 1]
```

```
Out[*]:=  $-b c + a d$ 
```

```
In[*]:= Expand[rdet[Table[a_{10 i+j}, {i, 3}, {j, 3}]] /. epsilon -> 1]
```

```
Out[*]:=  $-a_{13} a_{22} a_{31} + a_{12} a_{23} a_{31} + a_{13} a_{21} a_{32} - a_{11} a_{23} a_{32} - a_{12} a_{21} a_{33} + a_{11} a_{22} a_{33}$ 
```