$$det(U) = U_{11} \times det(U_{12})$$

$$det(U_{12}) = U_{12} \times det(U_{33})$$

$$\vdots$$

$$det(U_{n-1}) = U_{n-1} = U_{n-1}$$

$$det(U_{n-1}) = U_{n-1} = U_{n-1}$$

$$det(U_{n-1}) = U_{n-1} = U_{n-1}$$

$$det(U_{n-1}) = U_{n-1} = U_{n-1}$$