

# Similar Matrices

If  $A$  and  $B$  similar, then they have the same characteristic polynomial.

$$\begin{aligned}A - \lambda I &= PBP^{-1} - \lambda I \\&= PBP^{-1} - \lambda PP^{-1} \\&= (PB - \lambda P)P^{-1} \\&= P(B - \lambda I)P^{-1}\end{aligned}$$

$$\det(A - \lambda I) = \det(P(B - \lambda I)P^{-1})$$

$$\det(A - \lambda I) = \det(P) \det(B - \lambda I) \det(P^{-1})$$

$$\det(A - \lambda I) = \det(P) \det(P^{-1}) \det(B - \lambda I)$$

$$\det(A - \lambda I) = \det(B - \lambda I)$$

## Note

The converse is not always true.