Matrix Inverse via LU factorization

input : $n \times n$ matrix $[A]$
output: $[A]^{-1}$

$[L], [U] \leftarrow$ `lu_decompose`$([A])$
for $k \leftarrow 1$ **to** n **do**
  $\{e_k\} \leftarrow$ unit vector with 1 at element k; 0 elsewhere
  $A^{-1}[:, k] \leftarrow$ `lu_solve`$([L], [U], \{e_k\})$
end