

# Financial Mathematics

## Matrix types

$$0024-1. \quad A := \begin{bmatrix} 3 & -2 \\ 4 & -3 \end{bmatrix} \quad B := \begin{bmatrix} 3 & -2 \\ 4 & -3 \end{bmatrix}$$

$$N := \begin{bmatrix} 0 & 7 \\ 0 & 0 \end{bmatrix} \quad D := \begin{bmatrix} 4 & 0 \\ 0 & 8 \end{bmatrix} \quad S := \begin{bmatrix} 4 & 0 \\ 0 & 4 \end{bmatrix}$$

- a. Compute  $AB$  and  $BA$ .
- b. Compute  $ANB$ .
- c. Determine if  $N$  is nilpotent.
- d. Determine if  $ANB$  is nilpotent.
- e. Compute  $ADB$ .
- f. Determine if  $ADB$  is diagonal.
- g. Compute  $ASB$ .
- h. Determine if  $ASB$  is scalar.
- i. Determine if  $D + N$  is a Jordan block.
- j. Determine if  $S + N$  is a Jordan block.
- k. Compute  $A(S + N)B$ .
- l. Determine if  $A(S + N)B$   
is a Jordan block.

0024-2. Compute  $\exp \begin{bmatrix} 6 & -2 \\ 0 & 6 \end{bmatrix}$ . either give hint,  
or move to 0025

0024-3. Find a  $2 \times 2$  orthogonal matrix  
whose first row has entries:  
 $-4/5, 3/5$ .

0024-4. Does there exist a  $2 \times 2$  orthogonal  
matrix whose first column has entries:  
 $2/3,$   
 $1/3?$