**Examples of the following matrices + why they are called so**

**Square matrix** (all the following are square matrices)

* Called “square matrix” because it is a matrix with equal number of rows & columns.

e.g. , 3 rows = 3 columns

**Symmetric matrix**

* Called “symmetric matrix” because it is a matrix where the elements can be mirrored   
   across the diagonal from the upper left to lower right (also a square matrix).

e.g.

**Diagonal matrix**

* Called “diagonal matrix” because it is a matrix with only non-zero elements on the diagonal   
   from the upper left to lower right (also a square matrix).

e.g.

**Identity matrix**

* Called “identity matrix” because it is a matrix with only 1s on the main diagonal  
   and 0 everywhere else - special kind of diagonal matrix (therefore also still a square matrix)

e.g.

**J Matrix and 0 matrix**

* Called “J matrix” because it’s elements just consists of ones (also a square matrix).
* e.g. , only 1s
* Called “0 matrix” because it’s elements just consists of zeros (also a square matrix).
* e.g. , only 0s
* *From the Gill book*

**Exercise 1.1**

Perform the following vector multiplication operations

1. ****

makes the second vector a column vector (vector transposition)

multiplies the 2 vectors (scalar product)

**The vector multiplication results this scalar**

1. **Et billede, der indeholder typografi, Font/skrifttype, kalligrafi, håndskrift

   Automatisk genereret beskrivelse**

makes the second vector a column vector (vector transposition)

multiplies the 2 vectors (cross product)

**The cross product between the vectors is**

1. **Et billede, der indeholder typografi, Font/skrifttype, tekst, linje/række

   Automatisk genereret beskrivelse**

makes the second vector a column vector (vector transposition)

multiplies the 2 vectors (scalar product)

**The vector multiplication results this scalar**

1. **Et billede, der indeholder Font/skrifttype, typografi, hvid, tekst

   Automatisk genereret beskrivelse**

makes the second vector a column vector (vector transposition)

multiplies the 2 vectors (cross product)

**The cross product between the vectors is**

1. ****

makes the second vector a column vector   
 (vector transposition)

multiplies the 2 vectors (scalar product)

**The vector multiplication results this scalar**

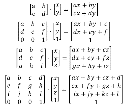
1. ****

makes the second vector a column vector (vector transposition)

multiplies the 2 vectors (scalar product)

**The vector multiplication results this scalar**

**Exercise 3.10 - outer products(?)**

**for matrix and vector multiplications** **matrix and column vector multiplications**

Perform the following vector/matrix multiplications

1. **Et billede, der indeholder Font/skrifttype, nummer/tal, linje/række, diagram

   Automatisk genereret beskrivelse**

multiplies each row-element of the matrix   
 with the corresponding elements of the vector

**The matrix multiplication result is**

1. Et billede, der indeholder skærmbillede, nummer/tal, Font/skrifttype, linje/række

   Automatisk genereret beskrivelse

multiplies each row-element of the matrix   
 with the corresponding elements of the vector

I forgot to write them like this but the elements of each row should be added together  
(as this matrix needs to have the number of rows as the 1st matrix AND number of cols of the 2nd matrix as the number of columns - which here is 1)

**The vector matrix multiplication result is**

outer product between matrix and row vector

1. **Et billede, der indeholder Font/skrifttype, diagram, nummer/tal, linje/række

   Automatisk genereret beskrivelse**

multiplies each col-element of the matrix with the corresponding column of the vector

**The matrix multiplication result is (same result as when same vector was col V,**

**but now a row vector)**

1. **Et billede, der indeholder skærmbillede, nummer/tal, linje/række, Font/skrifttype

   Automatisk genereret beskrivelse**

I forgot to write them like this but the elements of each row should be added together  
(as this matrix needs to have the number of rows as the 1st matrix AND number of cols of the 2nd matrix as the number of columns - which here is 1)

**The matrix multiplication result is**

**Exercise 3.7**

1. **Show that pre-multiplication and post-multiplication with the identity matrix are equivalent**

Cause a Matrix multiplied with the identity matrix equals the identity matrix regardless of the order of multiplication.

Shown with examples - done by ChatGPT cause I’m tired :D  
Et billede, der indeholder tekst, Font/skrifttype, skærmbillede, nummer/tal

Automatisk genereret beskrivelse

**Exercise 3.11**

Perform the following matrix multiplications

1. **Et billede, der indeholder diagram, linje/række, nummer/tal, Font/skrifttype

   Automatisk genereret beskrivelse**

**The matrix multiplication result is**

1. **Et billede, der indeholder nummer/tal, diagram, linje/række, Font/skrifttype

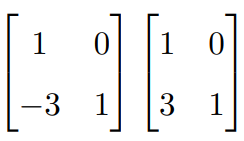
   Automatisk genereret beskrivelse**

**The matrix multiplication result is**

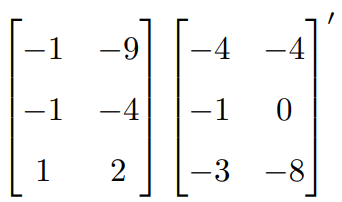
1. **Et billede, der indeholder diagram, nummer/tal, Font/skrifttype, linje/række

   Automatisk genereret beskrivelse**

**The matrix multiplication result is**

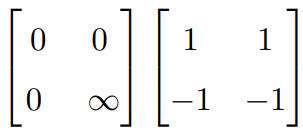
1. ****

…

1. ****

finds the transpose of the second matrix

**The matrix multiplication result is**

1. ****

…

**Exercise 3.13** (challenging)

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**Exercise 3.22**

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