

- 1) (6 pts) Given the quantities

$$A = \begin{pmatrix} -3 & 1 \\ 0 & 4 \\ 1 & -2 \end{pmatrix}; \quad B = \begin{pmatrix} 1 & 2 & 3 \\ -1 & 2 & -1 \end{pmatrix}; \quad x = \begin{pmatrix} 2 \\ 1 \end{pmatrix}; \quad y = \begin{pmatrix} 1 \\ -1 \\ -2 \end{pmatrix}$$

compute  $AB$  and  $BA$ .

- 2) (6 pts) For  $A$  and  $x$  as defined in Problem 1, compute  $\|x\|_1$ ,  $\|x\|_2$ ,  $\|x\|_\infty$ ,  $\|A\|_1$ ,  $\|A\|_\infty$ ,  $\|A\|_F$ .
- 3) (2 pts) Prove that if  $r$  is a vector of length  $n$ , then

$$\|r\|_2^2 = r^T r.$$