

CSI 30, Homework 6 on section 2.6, 3.1

Due by Wed, Mar 29.

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Please use lots of space and explain your answers, showing clearly any work you had to do. Each question is worth 3 points for a total of 21.

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(1) Let  $A$  be the  $4 \times 2$  matrix  $[a_{ij}] = \begin{bmatrix} 2 & 5 \\ 3 & 4 \\ 1 & 0 \\ 8 & -9 \end{bmatrix}$

- (a) What is  $a_{11}$ ?
- (b) What is  $a_{32}$ ?
- (c) Write the fourth row as a  $1 \times 2$  matrix.
- (d) Give  $A^t$ , the transpose of  $A$ . (Hint: Your answer should be a  $2 \times 4$  matrix.)

(2) For the matrices  $M = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$  and  $N = \begin{bmatrix} 2 & 3 \\ -1 & 0 \end{bmatrix}$  calculate

- (a)  $M + N$
- (b)  $MN$
- (c)  $N^2$

(Hint: for parts (b) and (c) you should be using matrix multiplication, meaning rows of the first matrix times columns of second. Also  $N^2$  just means  $NN$ .)

(3) Let  $M = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$  again.

- (a) Write down the identity matrix  $I_2$ .
- (b) Compute:  $I_2M$
- (c) Compute:  $MI_2$

(4) For the zero-one matrices  $A = \begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$  calculate

- (a)  $A \wedge B$
- (b)  $A \vee B$
- (c)  $A \odot B$

(5) Show all the steps used by the procedure *max* we saw in class to find the biggest number in the list: 3, 4, 8, 2

- (6) Give an algorithm to find the sum of all the integers in a list. First describe your algorithm in words, then write it in pseudocode. It should look like a simpler version of the procedure *max*.
- (7) Show all the steps used by the procedure *binary search* we saw in class to search for 8 in the ordered list: 2, 4, 7, 8, 9. Make a table showing the values of  $i$ ,  $j$  and  $m$  at each step. So the first row in the table has  $i = 1$ ,  $j = 5$  and  $m$  is computed to be 3. What is the output?
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If you get stuck on a question or aren't sure if you understand it:

- Go over the relevant class notes and section in the textbook.
- Check if you get the right answer for a similar odd-numbered question in the textbook (answers at the back of the book).
- Ask me about it after class.
- Come to my office hours: Tue 3 - 4, Wed 3 - 4 in CP 317.
- Go to the Math Tutorial Lab in-person in CP 303 or online.