

Engineering 15 – Spring, 2015
Practice Exam 1 SOLUTION

1) (6 Points 1 point each)

Define the order (size) of the matrix that will result from each of the following operations - if you feel a particular operation is impossible, indicate this.

- a) Multiply a 3×5 matrix by a 5×2 matrix: 3x2
- b) Multiply a 3×5 matrix by a scalar constant k : 3x5
- c) Add a 3×4 matrix to a 4×3 matrix: impossible
- d) Multiply a 5×2 matrix with a 3×5 matrix: impossible
- e) Multiply a 1×4 matrix by a 4×1 matrix: 1x1 or a scalar
- f) Subtract a 4×2 matrix from a 4×2 matrix: 4x2

2) (2 Points)

What would be the result of adding the $X(4,1)$ element to the $X(2,3)$ element, given that the matrix

$$X = \begin{bmatrix} 2 & 1 & -1 \\ 1 & 1 & 2 \\ 4 & 0 & -1 \\ -3 & 1 & 1 \end{bmatrix}$$

Answer: -1

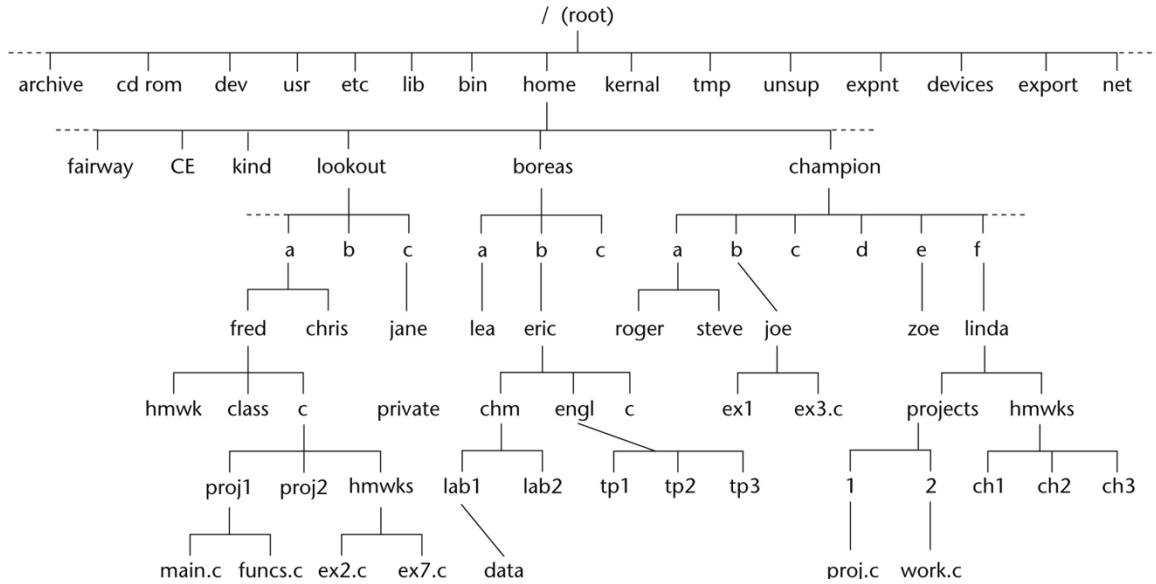
3) (4 Points)

Show that A is the inverse of B, where $A = \begin{bmatrix} -1 & 2 \\ 0 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & -2 \\ 0 & -1 \end{bmatrix}$.

$$AxB = \begin{bmatrix} 1+0 & 2-2 \\ 0+0 & 0+1 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

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1) For the following directory tree, assume that you have successfully logged into unix under the user account "joe." Answer all of the following questions assuming your working directory is "joe"



- you type in the command "pwd", what is the output that the computer will print on the screen:
/home/champion/b/joe
- Using relative addressing, what is the single command to list the contents of linda's projects directory:
ls ../../f/Linda/projects
- Assuming you have the permission, use absolute addressing to move the file funcs.c to the present working directory:
mv /home/lookout/a/fred/c/proj1/funcs.c . or mv ~fred/c/proj1/funcs.c .
- Assuming you have the permission, use relative addressing to copy the file "main.c" to the directory "ex1" and rename it "web.html".
cp ../../../../lookout/a/fred/c/proj1/main.c ex1/web.html
- Assuming you have the permission, what is the single command to remove the files "main.c" and "funcs.c" (use absolute addressing):
rm /home/lookout/a/fred/c/proj1/.c or rm /home/lookout/a/fred/c/proj1/**
or
rm ~fred/c/proj1/.c or rm ~fred/c/proj1/**
- What is the single command to add a subdirectory called lab3 into the "ex1" directory. (use relative addressing):
mkdir ex1/lab3

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5) (18 Points) 3 points each

Given the excel worksheet below, with an array of numbers (B3:E8), answer the following:

	A	B	C	D	E	F
1						
2						
3		2	6	7	5	
4		3	5	6	4	
5		4	1	6	7	
6		8	0	1	2	
7		1	9	9	8	
8		5	12	2	1	
9						
10						
11						
12						
13						
14						
15						

a) If cell B11 contains the formula
`"=SUM(B3:B8)/AVERAGE(B3:B8)"`
 , what will the displayed numerical
 value in B11 be?

6

b) If cell B12 contains the formula
`"=C4-D6"` and this cell is copied to
 cell C13, what will the displayed
 numerical value in cell C13 be?

-2

c) If cell D12 contains the formula
`(=D3*E4)` and this cell is copied to
 cell B13, what will the displayed
 numerical value in cell B13 be?

3

d) If cell C11 contains the formula
`(=B$4+$D4)` and this cell is copied to
 cell D13, what will the displayed
 numerical value in cell D13 be?

6

e) If cell C12 contains the formula
`"=SUM(C4:D5)"`, what will the
 displayed numerical value in cell C12
 be?

18

f) If cell E11 contains the formula
`"=AVERAGE(C5,E5)"`, what will the
 displayed numerical value in cell E11
 be?

4

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6) (8 Points)

If you add the age of six people, Alice, Barb, Carol, Dean, Eric and Fred the total is 92. Alice is twice the age of Carol. The total age of Barb and Eric equals that of Fred. The total age of Alice and Carol equals the total age of Barb and Fred. Carol is 8 years younger than Fred. If you subtract the age of Eric and Carol from Dean the result is 10. What is the age of each person?

- a) . Set up the set of linear equations that show the relationships among all the unknowns

$$A + B + C + D + E + F = 92$$

$$A = 2C$$

$$B + E = F$$

$$A + C = B + F$$

$$C + 8 = F$$

$$D - (E + C) = 10$$

- b) Convert the linear equations into matrices of the form $Ax = b$, and show what the values are of each matrix.

$$A = \begin{bmatrix} 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 0 & -2 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 & -1 \\ 1 & -1 & 1 & 0 & 0 & -1 \\ 0 & 0 & 1 & 0 & 0 & -1 \\ 0 & 0 & -1 & 1 & -1 & 0 \end{bmatrix} \quad x = \begin{Bmatrix} A \\ B \\ C \\ D \\ E \\ F \end{Bmatrix} \quad b = \begin{Bmatrix} 92 \\ 0 \\ 0 \\ 0 \\ -8 \\ 10 \end{Bmatrix}$$

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7) The EXCEL expression :

**=IF(OR(A3>1800,A3<1600,A3=1725),"great ","not ")&IF(A3<=1600,"fun",
IF(A3<=1800, "waste of time", "instructor"))**

is typed into cell B1 and then copied and pasted into cells B2:B4. Write in the text produced in each corresponding cell.

	A	B
1	1999	great instructor
2	1630	not waste of time
3	1500	great fun
4	1725	great waste of time