Please state clearly all assumptions made in order for full credit to be given.

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Problem #1 (10 %)

Given the system of equations:

\[ \begin{align*}
2x + y - z - 1 &= 0 \\
x - 2y + 2z - 2 &= 0 \\
3x - y + 2z - 2 &= 0
\end{align*} \]

The following MATLAB code was generated to determine the x, y, and z solutions:

```matlab
A=[2;1;-1;1;1,-2;2;3,-1;2;2]

rref(A)
```

the following error is encountered when the script file is run:

```matlab
??? Error using ==> vertcat
CAT arguments dimensions are not consistent.
```

What is causing the error? Rewrite the 2 lines of code manually fixing any errors.
Problem #2 (20%)

For the following matrices:

\[ A = \begin{bmatrix} 2 & 1 & -1 \\ 1 & -2 & 2 \\ 3 & -1 & 2 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 1 \\ 2 & 3 \\ 3 & 3 \end{bmatrix} \quad C = \begin{bmatrix} 1 & -1 & 2 \\ 2 & 4 & 0 \end{bmatrix} \quad D = \begin{bmatrix} 1 & -2 \\ 3 \end{bmatrix} \]

Determine the following expressions. If an expression is not valid simply state the reason, show ALL work for others!

a. BC 
   (4)
b. CA 
   (3)
c. B + C 
   (2)
d. B^t + C 
   (3)
e. Determinant of A using the duplicate column method 
   (3)
f. Determinant of B 
   (2)
g. D^t 
   (3)

Note: You need to show all work to receive full credit.
Problem #3 (25 %)

Three cables (AD, BD and CD) are connected at point D where a 15.60kN force is applied. Determine:

a. the particle to be analyzed (2)

b. draw a complete FBD showing the particle and all the forces acting on it (6)

c. write the equilibrium equations (8)

d. the magnitude of the force in each of the cables AD, BD and CD (9)

Note: You have to draw any required FBD and show all work to receive full credit
Problem #4 (20%)

In the following figure:

a. Replace the system of forces and couple by a resultant force and a resultant couple at A. Express your answer in Cartesian Vector Form.

b. Determine the magnitude and the direction of the resulting torque

Note: To receive full credit all intermediate work should be shown
Problem #5 (25%)

a. Draw a complete and separate free body diagram
b. Determine the reaction components at supports A (smooth hinge) and B (smooth roller)

Note: You need to show all intermediate work to receive full credit