Matrix Warmup[1]

Let

$$\boldsymbol{A} = \begin{pmatrix} 1 & 1 \\ 1 & 2 \\ 1 & 3 \end{pmatrix}, \quad \boldsymbol{B} = \begin{pmatrix} 4 & 7 \\ 1 & 2 \end{pmatrix}, \quad \boldsymbol{x} = \begin{pmatrix} 4 \\ 2 \end{pmatrix}, \quad c = 3, \quad \boldsymbol{I}_3 = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

Compute each of the following, or specify that it's not possible.

1. $\boldsymbol{A} + \boldsymbol{A}$

2. $\boldsymbol{x} + \boldsymbol{A}$

3. $c\boldsymbol{A}$

4. $\boldsymbol{A}\boldsymbol{x}$

5. $\boldsymbol{x}\boldsymbol{A}$

6. $\boldsymbol{I}_3\boldsymbol{A}$

7. $\boldsymbol{A}'$

8. $\det(\boldsymbol{B})$

9. $\boldsymbol{B}^{-1}$

10. $\boldsymbol{x}'\boldsymbol{x}$

[1]This is based on a worksheet created by Professor Charlotte Wickham of Oregon State University.

To check your answers, you can use R:

```
A <- matrix(c(
    1, 1,
    1, 2,
    1, 3
  ),
  ncol=2, byrow=T)
B <- matrix(c(
    4, 7,
    1, 2
  ),
  ncol=2, byrow=T)

x <- matrix(c(4, 2), ncol=1, byrow=T)

c <- 3

I_3 <- diag(nrow = 3)
```

```
# 1
A + A
# 2
x + A
# 3
c * A
# 4
A %*% x
# 5
x %*% A
# 6
I_3 %*% A
# 7
t(A)
# 8
det(B)
# 9
solve(B)
# 10
t(x) %*% x
```

A nice reference about matrix algebra in R:
`https://www.statmethods.net/advstats/matrix.html`