

HM 1 - Matrix Algebra

PSY 533

Wednesday, January 14, 2015

DUE: January 23, before midnight

INSTRUCTIONS: Submit work as an R file emailed to piccinin@uvic.ca and andkov@uvic.ca

NAMING: Please name your file: “PSY-533-HM1-Lastname-Firstname.R”

1. Demonstrations

With three randomly generated matrices of the order (5,1), demonstrate the work of:

- a) Associative Law of matrix addition
- b) Distributive Law of matrix addition

Using the matrices from **3.Computations** of this HM demonstrate:

- c) Associative rule of matrix multiplication
- d) Distributive rule of matrix multiplication
- e) that matrix multiplication is not commutative

2. Word problem

Given the data vector

4, 7, 2, 5, 8

transform the standardized scores so that its variance quadruples and the new mean becomes equal to the value of raw scores's median. Round to remove decimals.

3. Computations

Given the matrices

$$\mathbf{A} = \begin{bmatrix} 1 & 3 & 4 \\ 5 & 0 & 8 \\ 3 & 2 & 9 \end{bmatrix} \quad \mathbf{B} = \begin{bmatrix} 1 & 3 & 13 \\ 2 & 3 & 1 \\ 1 & 3 & 8 \end{bmatrix} \quad \mathbf{C} = \begin{bmatrix} 6 & 7 & 4 \\ 8 & 6 & 2 \\ 19 & 11 & 8 \end{bmatrix}$$

Compute the following:

- a) $\mathbf{A} + \mathbf{B}$
- b) \mathbf{CC}'

c) $\mathbf{A} - \mathbf{C}$

d) $Tr(\mathbf{A}\mathbf{A})'$

e) $Tr(\mathbf{A}'\mathbf{C})$

4. Are you smarter than a fifth-grader?

Solve with matrix algebra in R:

$$\begin{aligned} 2x + 2y &= 3 \\ x - 4y &= -1 \end{aligned}$$