# 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 two 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

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4, 7, 2, 5, 8
```

transform the standardized scores to quadruple the size of variance and shift the new mean to the value of the median of the raw scores. Round to remove decimals.

### 3. Computations

Given the matrices

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

Compute the following:

a) $\mathbf{A} + \mathbf{B}$

b) $\mathbf{CC}'$

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

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

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

**4. Are you smarter than a fifth-grader?**

Solve with matrix algebra in R:

$$2x + 2y = 3$$
$$x - 4y = -1$$