Functions Exercises

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1. **(a)** Write functions `tmpFn1` and `tmpFn2` such that if `xVec` is the vector $(x_1, x_2, \ldots, x_n)$, then `tmpFn1(xVec)` returns the vector $\left(x_1, x_2^2, \ldots, x_n^n\right)$ and `tmpFn2(xVec)` returns the vector $\left(x_1, \frac{x_2^2}{2}, \ldots, \frac{x_n^n}{n}\right)$.

(b) Now write a function `tmpFn3` which takes 2 arguments `x` and `n` where `x` is a single number and `n` is a strictly positive integer. The function should return the value of

$$1 + \frac{x}{1} + \frac{x^2}{2} + \frac{x^3}{3} + \cdots + \frac{x^n}{n}$$

2. Write a function `tmpFn(xVec)` such that if `xVec` is the vector $\mathbf{x} = (x_1, \ldots, x_n)$ then `tmpFn(xVec)` returns the vector of moving averages:

$$\frac{x_1 + x_2 + x_3}{3}, \quad \frac{x_2 + x_3 + x_4}{3}, \quad \ldots, \quad \frac{x_{n-2} + x_{n-1} + x_n}{3}$$

Try out your function; for example, try `tmpFn( c(1:5,6:1) )`.

Note: A useful procedure to write functions is to: 1) Carefully consider the computational steps necessary for the function to complete its task; 2) Write commands in R (that are not initially in a function) that accomplish those steps one-by-one. Only after you verify that the execution of those step-by-step commands, one at a time, satisfy the requirements of the entire function, should you 3) embed them in a function.