1 Instructions

2 \LaTeX

The $l_1$ and $l_2$ norms of a vector $x$ may be defined as shown in Equation 1 below.

$$||x||_1 = \sum_{i=1}^{n} |x_i|$$

$$||x||_2 = \left( \sum_{i=1}^{n} x_i^2 \right)^{1/2} = \sqrt{x \cdot x}$$  \hspace{1cm} (1)

All computations in this document were carried out in the R software environment (R Core Team, 2013).

3 R

1. \texttt{mynorms <- function(v,l)}
   + \{ \texttt{1} \texttt{if( is.vector(v) && is.numeric(v) && (l == 1 || l==2))} \texttt{2}
   + \texttt{1} \texttt{if(l == 1)} \texttt{2}
   + \texttt{1} \texttt{val <- sum( abs(v))} \texttt{2}
   + \texttt{1} \texttt{else} \texttt{2}
   + \texttt{1} \texttt{val <- sqrt(sum(v^2))} \texttt{2}
   + \texttt{1} \texttt{return(val)} \texttt{2}
   + \texttt{1} \texttt{else} \texttt{2}


2. > mynorms( rpois(10,7), 2)
   [1] 17.14643

3. > mynorms( c("Alice","Benji"), 4)
   [1] "Invalid argument."

4. > system.time( mynorms( rpois(1000000,7), 1))

    user  system elapsed
   0.070  0.002  0.073

References