# R code for $I_{\mathbf{dep}}$ and $I_{\mathbf{mmi}}$ PIDs for Gaussian systems

These notes describe how to use the package R to compute PIDs for Gaussian systems[1]. The output for the numerical examples in the paper was produced using version 3.4.3 of R, which can be downloaded from `http://cran.r-project.org`.

A script for running Examples 5 and 6 is available in the folder IdepFuns, in the file, IdepGscript.R. Once R is loaded, the user is required to set a working directory and then to load the functions that are contained in the file, IdepGauss.R.

Commands given in IdepGscript.R can then be run by copying and pasting them into R and running them or by selecting and running them in RStudio. Data used in examples 5 & 6 in the paper are provided in this file.

The folder IdepFuns contains the definitions of four functions, given as follows

| Function | Inputs | Outputs |
|---|---|---|
| idepGU | $p, q, r$ | $I_{dep}$ and $I_{mmi}$ PIDs (univariate) |
| idepGM | sizes, mat | $I_{dep}$ and $I_{mmi}$ PIDs (multivariate) |
| DevTestU | $p, q, r, n$ | Model names and p-values |
| DevTestM | sizes, mat, $n$ | Model names and p-values |

where

- $p$ is the correlation between $X_0$ and $X_1$

- $q$ is the correlation between $X_0$ and $Y$

- $r$ is the correlation between $X_1$ and $Y$

- $n$ is the number of observations (sample size)

- sizes is a numeric list of the values $n_0, n_1, n_2$

- mat is a positive definite covariance or correlation matrix

Robin Ince has posted some Matlab code at
`https://github.com/robince/partial-info-decomp/blob/master/calc_pi_Idep_mvn.m`

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[1]Kay & Ince (2018): Exact partial information decompositions for Gaussian systems based on dependency constraints (*submitted*)