

ExerciseSymmetry

1. The DCM test statistic is symmetric.

For two signals ($K_1 = 2$), this symmetry for tested frequencies is

$$z(f_1, f_2) = z(f_2, f_1).$$

For three signals ($K_1 = 3$), this symmetry for tested frequencies is

$$\begin{aligned} z(f_1, f_2, f_3) &= z(f_1, f_3, f_2) = z(f_2, f_1, f_3) = \\ z(f_2, f_3, f_1) &= z(f_3, f_1, f_2) = z(f_3, f_2, f_1). \end{aligned}$$

Can you explain what causes this symmetry?

2. DCM tests only frequency combinations that fulfill $f_1 > f_2 > f_3 > f_4 > f_5 > \dots > f_{K_1}$. Can you explain why?
3. Assume that the DCM model $g(t)$ frequencies are equal ($f_1 = f_2$), or they approach each other ($f_1 \rightarrow f_2$). Can you explain why this $g(t)$ model makes no sense?

Return your answer in an e-mail to the assistant, preferably in a pdf-file **Symmetry.pdf**, where the original L^AT_EX file is **Symmetry.tex**. You can also send a scanned copy of your hand written notes. In that case, make sure that the copy is easy to read.

Tip: The answers to all three question can be deduced from **Paper I** Equations 1-5 and 7-11.

Grading: One or two correct (or nearly correct) answers give 1 point ($1/3 \times 2 = 0.66$, $2/3 \times 2 = 1.33$). Three correct (or nearly correct) answers give 2 points.