Report 2

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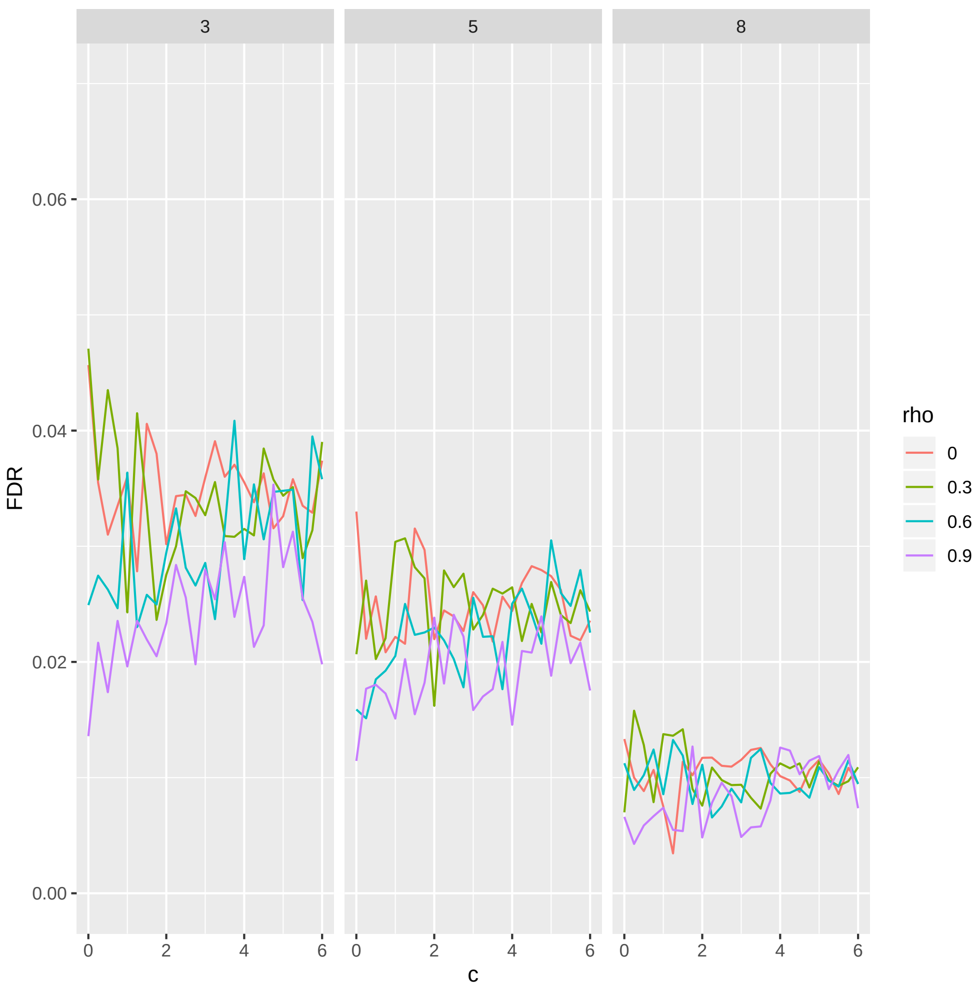
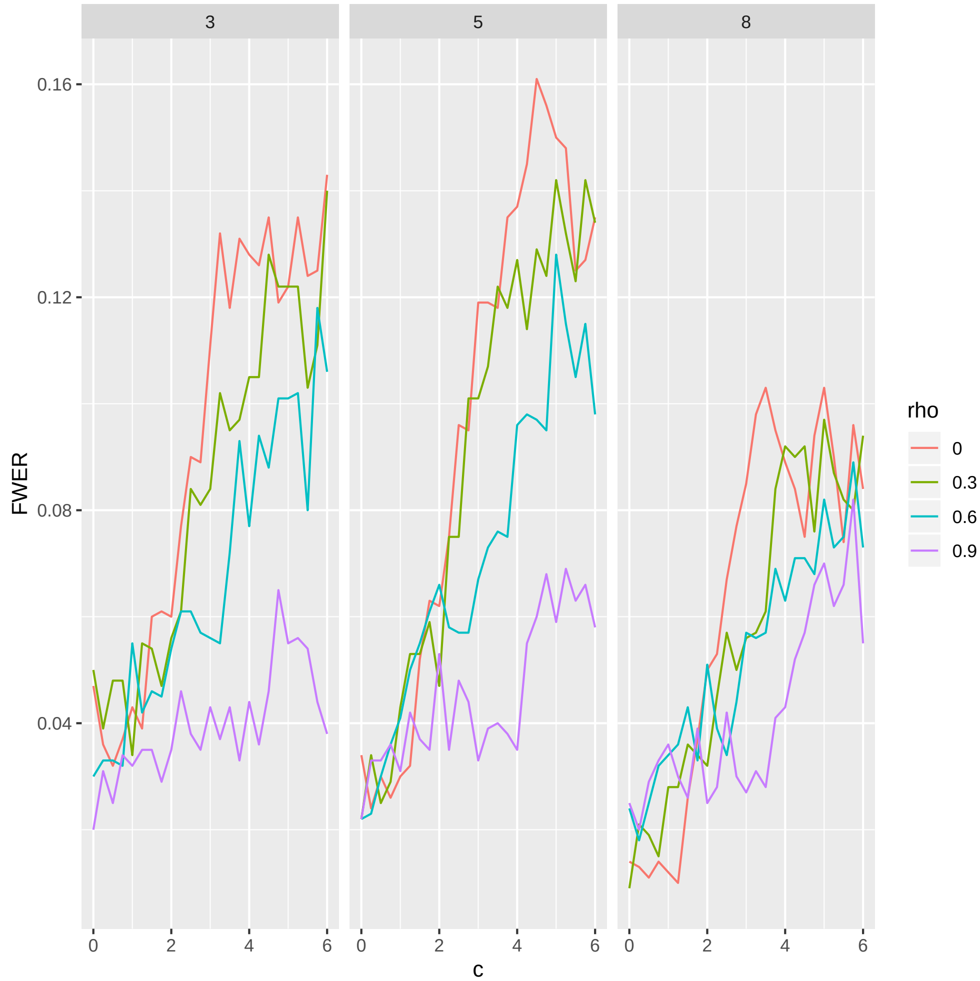
In the second report we'll concentrate on the Benjamini-Hochberg procedure. By simulation, we're going to compute: the FDR, the FWER and the average power of this procedure for different correlations and number of non-null components of the vector θ. The results will be shown on plots.
Instead of dividing report in two parts (exercise 1 and 2), I'm going to show the curves from the both tasks on the one plot.

FDR



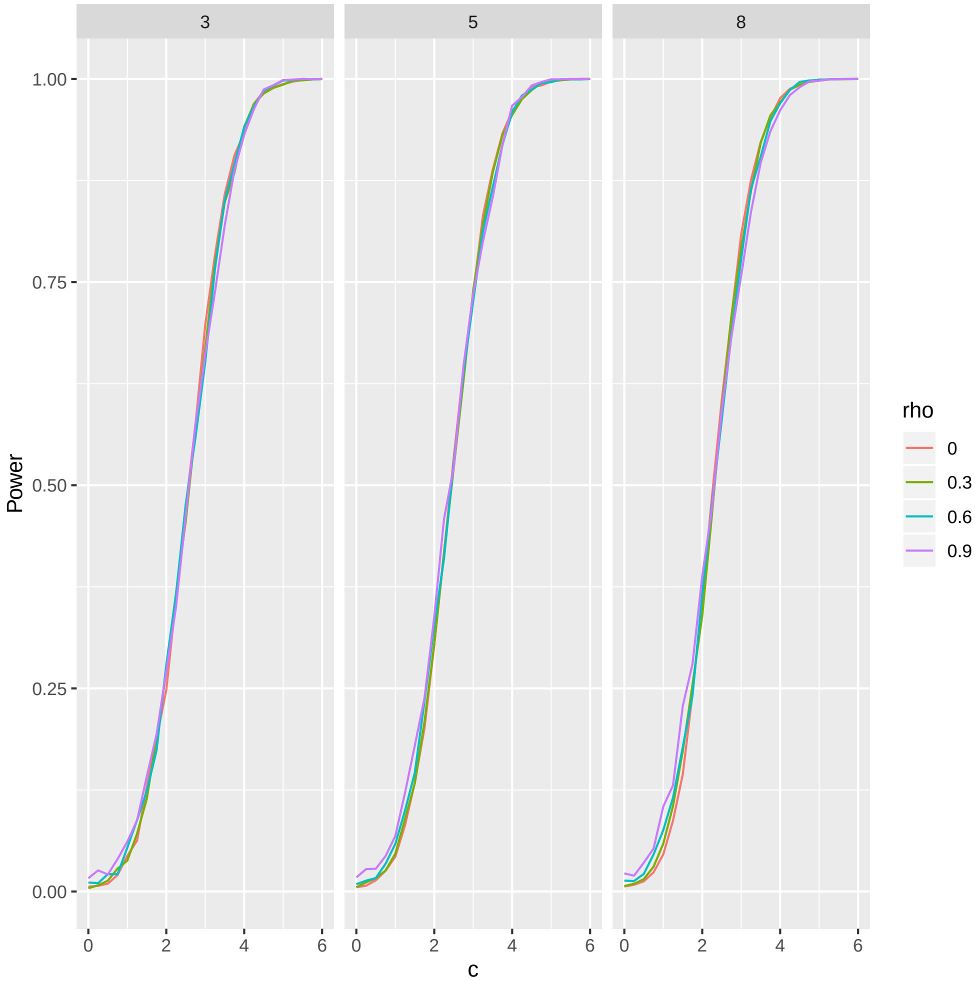
The first thing that we may notice is that with increasing the number of non-null components of the mean vector (3 -> 5 -> 8), the FDR decreases. What is more, for the highest correlation, the FDR is the smallest - it is noticeable, that for smaller correlation, the value of this statistics increases. Also differences between the curves are changing on each plot - for higher number of non-zero elements of θ, the discrepancy between the curves is getting reduced.

FWER



In case of the FWER, plots for 3 and 5 non-null components are very similar. Bigger difference is visible when it comes to s=8. Like in the FDR: correlation has an influence - the higher the correlation, the smaller the Family Wise Error Rate. Which means that probability of having at least one false positive decreases with increasing the correlation. Discrepancies between highest and lowest FWER are much bigger than for FDR. On the second plot difference between the highest and the lowest value is equal to around 15%.

Power



The plots of the average power are almost the same and there are no big differences between the curves. The only tiny difference may be noticed for the left side of the third plot (when number of non-zero entries is equal to 8). Also, with increasing the value of s, the plots of the average power are growing a little faster (especially when c is smaller than 2). But as I said before, it's not a big difference.