Assignment: Psychological Networks

Network of depressive symptoms (BDI) in healthy subjects:

1. Traurigkeit	12. Interesselosigkeit
2. Pessimismus	13. Entschlussunfähigkeit
3. Frühere Misserfolge	14. Wertlosigkeit
4. Verlust von Freude	15. Verlust an Energie
5. Schuldgefühle	16. Veränderung der Schlafgewohnheit
6. Gefühl, bestraft zu werden	17. Reizbarkeit
7. Abneigung gegen sich selbst	18. Veränderung des Appetits
8. Selbstvorwürfe	19. Konzentrationsschwierigkeiten
9.Selbstmordgedanken oder -wünsche	20.Müdigkeit
10. Weinen	21. Verlust des Interesses am Sex
11.Unruhe	

Each item can be scored with 0/1/2/3

Cut Offs: **0-8**: No depression / **9-13**: Minimal depression / **14-19**: Mild Depression / **20-28**: Moderate depression / **29-63**: Severe depression

Your Tasks

Implement the below listened tasks in R code. If necessary, answer questions in text form in R comments.

Preparation:

- Install and load the Package "KernSmoothIRT"
- Load BDI data
    - `Data(BDI)`

Data Inspection:

1. Plot a histogram of all BDI sum-scores, use exactly 30 bins *(hints: useful functions: rowSums(data), hist(…))*
2. How many of the healthy subjects can be classified with at least (!):
    a. Minimal depression / mild depression / moderate depression / severe depression *(hints: Can be done in a very similar way as when we checked how many network nodes we get in the models in the tutorial, get rid of NA's in data)*

Tasks & Questions:

3. Build an unpenalized psychological network
    a. Create a plot showing nodes and resulting edges
    b. How many edges are in the resulting model?
    c. Your opinion: Is the sample size reasonable for this?
4. Build a lasso regularized network for the BDI Data using default parameters.
    a. How many nodes do you get now?
5. Play around with lambda parameter, (*hint: look for minimal lambda ratio in function documentation)* try values 0.2 and 0.5. Plot the resulting models.

a. What is the minimum/maximum lambda parameter tested in the model fitting process, using 0.2 / 0.5 ratios?
b. Which lambda parameter was chosen for the final model using 0.2 / 0.5?
c. How does the lambda affect the number of nodes? How many edges do the resulting models contain, using the parameter 0.2 / 0.5?

6. Using lambda minimum ratio parameter of 0.5
    a. Which are the 5 most important symptoms in the network (according to "strength" criterion, inspecting plots is allowed as solution). Which symptom has the smallest influence in the network?
    b. Which are the 6 most important connections between symptoms?

    This last task requires some problem solving skills, it cannot be read from the plot.
    <u>Hints:</u>
        - *Take the matrix of edges from Network$graph*
        - *This will give you the indices of the maximum value: ind<- which(matrix1==max(matrix1),arr.ind=TRUE)*
        - *Build a loop (1 to 6), extract highest value & set it to zero after saving/printing index*