**Exercise 1** (10 marks)

**For this question use file: Dataset1\_2021.sav**

This file contains data from a (fictional) undergraduate study, investigating the relationships between personality traits and physical fatigue following a 4-hours long immersive session in a Virtual Reality environment. There are 7 variables in this dataset – the first three are personality variables: Extraversion; Conscientiousness and Openness. The fourth is a measure of daily physical activity level and the fifth is a measure of participant’s age. The last two are number of errors in a throwing task, before and after immersion in VR.

1. Identify outliers by ID number. Provide justification for how you would manage them in any outliers you find in any further analysis (3 marks, max 80 words)
2. Choose and run an analysis that will allow you to test the hypothesis that, after controlling for age, personality traits predict **changes** in throwing accuracy after extensive immersion in VR. Write a brief summary and interpretation of your findings that uses appropriate formatting. (5 marks, max 250 words)
3. If the researchers subsequently wanted to test the hypothesis that the amount of daily physical activity (in addition to personality variables) was a useful predictor of physical fatigue, after controlling for age and then personality variables, what problems would inclusion of this additional predictor create within such a model? (2 marks, max 70 words)

**Exercise 2** (6 marks)

**For this question use file: Dataset2\_2021.sav**

This file contains data from a (fictional) community-based family cohort study in which researchers measured children’s communication skills at the end of their first year of schooling. They were interested in the impact that being relatively older within the school year (e.g. being born towards the beginning, rather than end of the school year) had on a child’s communication skill development, and the factors that may affect this relationship between relative age and communication skills at the end of their first year.

Child communication skills were measured using a parental assessment (continuous measure), with higher values indicating better communication skills. Also measured were:

* How old a child is at the end of their first year of school (measured in months)
* Whether a child has any older siblings they interact with on a regular basis, measured by asking whether the child has at least one older sibling they live with (Yes or No?)

The researchers hypothesise that the greater a child’s relative age the better their communication skills will be. However, they also predict that this relationship may vary depending on whether a child has any older siblings they interact with on a regular basis.

1. Identify a type of analysis that would be best suited to testing this hypothesis. Run this analysis and in reporting its results include an APA formatted table. Then summarise your key findings in a few sentences. (4 marks, max 150 words [excluding table])
2. Imagine that further data becomes available on the participants involved in this study. Specifically:

* Results for how each child performed on a battery of Social Cognition Assessments they undertook in the summer before they began school. This includes an overall score for each child on the battery as a whole (i.e. a global average) and for how children performed on each subtest.
* A more detailed breakdown of children’s communications skills. Now, instead of just a single value for a child’s communication skills, you have data that breaks this up into ratings for a range of specific communication skills (e.g. talking, listening, working with others).

Building off the results of your analysis in Question 2a, plan a further analysis that could use this additional data to best effect to study whether one of the mechanisms by which age influences communication skills development is through it influencing how developmentally ready a child is for school, in terms of their social cognition abilities? In your answer clearly state the type of analysis you’d use to test this hypothesis, what roles specific variables would be designated in this analysis, and any adjustments you’d make to the original sample (2 marks, max 70 words)

**Exercise 3** (10 marks)

**For this question use file: Question3\_2021.sav**

This file contains data from a (fictional) study in which researchers investigated the impact on memory performance after participating to a of providing weekly social engagement activities for a year, to a large group of elderly individuals in an assisted living complex. As part of this study the research team were also interested in exploring whether the intervention might be particularly beneficial for certain groups within their sample.

Firstly they randomly allocated participants to either participate in the social engagement activities or attend a non-social control condition (e.g. a weekly reading session). Secondly, they identified participants upon recruitment who, due to two personality traits, might be at an increased risk of cognitive decline. They categorised personality traits within their sample into three groups: *Both*Social *and* Creative, *Either*Social *or* Creative, and *Neither* Social *nor* Creative. The researchers predicted differences between participants who, prior to participating in the study, presented both proactive traits (i.e. Social and Creative) compared to all those who possessed at least one. They also hypothesised that those with neither proactive trait would have poorer memory than those with only one proactive trait.

Participants were assessed before, during (6 months) and at the end (12 months) of the year long intervention programme on a standardised memory assessment. It was theorised that the engagement activities might have particular benefits over both the short (up to 6 months) and medium term (up to 12 months) for memory performance and that these effects might be greater in individuals lacking proactive traits.

1. State the specific type of ANOVA you would use to analyse this dataset and summarise (using proper notation) the results for the statistical significance of the main-effects and interactions in your model (3 marks, max 175 words).
2. For any significant main effect(s) not involved also in significant interaction(s) use appropriate further procedures to explore between-level differences and present a summary of your findings, which also draws conclusions as to whether these results support any initial predictions by the research team (2 mark, max 130 words).
3. For any significant interactions include an appropriately (APA) formatted graphical illustration of them and write a brief summary that describes and interprets this figure. Where appropriate break down interactions further using additional statistical contrasts to give more detailed interpretations (3 marks, max 100 words [excluding graph])
4. Reflect on your responses to questions 3a, 3b and 3c and provide a conclusion summarising your results. This should include recommendations for further research and an indication of which groups within the elderly population it might be appropriate to promote this intervention to, which such claims justified by reference to your findings. (2 marks max 100 words)

**Exercise 4** (4 marks)

**For this question use file: Question4\_2021.sav**

Below is a description of a proposed research project. Based on the information provided, plan an analysis that you think would be most appropriate. For additional credit, run it using the dataset for this question and write a summary of your findings. (4 marks, max 225 words)

A research team are interested in the studying the impact that meditation might have on the health related quality of life in combat veterans being treated for Post Traumatic Stress Disorder (PTSD), comparing its value against other therapies. They propose recruiting a large number of therapists and ensuring they have training in four specific therapeutic approaches, which they can then trial with their patients (Trauma Focused Cognitive Behavioural Therapy [CBT]; Group Therapy; Eye Movement Desensitisation and Reprocessing [EDMR]; and Meditation).

The therapists then recruit combat veterans referred to their clinics into a randomised controlled trial. If a veteran agrees to participate, they are randomised to receive one of the four different types of therapy from the therapist. To measure health related quality of life the veterans keep a diary in the month prior to treatment beginning, indicating at the end of each day whether they judge it to have been a ‘mentally healthy’ day. They then also complete this same activity throughout the first month of treatment. To quantify the impact of treatment, researchers calculate the difference in the number of mentally healthy days reported between these two months.

The researcher predict that Meditation will be as effective, and possibly in some cases more effective, than the other therapies at increasing patients’ health related quality of life. In addition to this prediction, the researchers anticipate that there will be some dependency in their data and this would need to be controlled for prior to assessing their hypotheses. Also, through reading the background literature they identify that the severity of a veterans PTSD could be an important covariate to bear in mind. Consequently, they take a measure of symptom severity (using the PTSD checklist) when participants give their consent to participate.