**I. Pen-and-paper**

1. You can use Latex, OpenDocumentText or Word to write your report.

We suggest Cambria Math 11pt font for main text with single line spacing and 6pt paragraph.

You can use 10pt in tables and formulas, e.g.

You can paste images of handwritten solutions, yet guarantee high-quality resolution and contrast.

1. Answer 2
2. Answer 3
3. Answer 4

**II. Programming and critical analysis**

1. K=2, Silhouette Score: 0.3604, Purity: 0.6323

K=3, Silhouette Score: 0.2958, Purity: 0.6677

K=4, Silhouette Score: 0.2744, Purity: 0.6613

K=5, Silhouette Score: 0.2382, Purity: 0.6774

* 1. Explained variance by the top two principal components: 0.7714
  2. Top Variables for Component 1:

pelvic\_incidence (Weight: 0.5916)

lumbar\_lordosis\_angle (Weight: 0.5151)

pelvic\_tilt (Weight: 0.4670)

sacral\_slope (Weight: 0.3257)

degree\_spondylolisthesis (Weight: 0.2169)

pelvic\_radius (Weight: -0.1158)

Top Variables for Component 2:

pelvic\_tilt (Weight: -0.6704)

pelvic\_radius (Weight: -0.5811)

sacral\_slope (Weight: 0.4433)

pelvic\_incidence (Weight: 0.1000)

lumbar\_lordosis\_angle (Weight: 0.0800)

degree\_spondylolisthesis (Weight: 0.0046)

A group of colored dots

Description automatically generated with medium confidence

1. **Identifying Health-Related Subgroups**: Clustering allows us to group individuals with similar health characteristics into distinct categories. For example, it can help us find groups of people with severe health issues, those with milder conditions, and a relatively healthy group. This categorization helps us understand the diversity of health statuses within the population.

**Visualizing Health Patterns**: Through visualizations that compare clustering results to actual diagnoses, we can assess how well the clusters reflect real health conditions. If the clustering aligns with actual health statuses, it becomes a useful tool for categorizing individuals based on their health patterns. These insights can inform healthcare decisions and strategies tailored to specific health categories within the population.

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**END**