Question 3

Dependency can be explained by the pairwise scatterplot, and based on the scatterplot, and the linear relation to each variable to the subsequent Year 5,10,15,20 and 25 can be observed. The dependency of Year 5 to the subsequent years is shown above and a pattern can be observed, where the dependency of the Year 5 to Year 10 is strongest and the subsequent years decreases as it approaches Year 25, which is depicted by the linear relationship of the scatterplot. On the other hand, there are further findings that can be observed.

- Observation 1: Year 1 has a stronger dependency to Year 5, as compared to the subsequent years later as the dependency decreases, which can be observed from the linearity of the scatterplot.
- Observation 2: Year 5 has a stronger dependency to Year 10, as compared to the subsequent years later and its dependency is much more prominent that Observation 1.
- Observation3: Year 15 has the strongest dependency to Year 20, as compared to the previous two observations.

Based on the line graph, these are the finding that can be observed.

- Observation1: a comparison from Year 1 to the subsequent years, the correlation decreases to below 0.5 in Year 25.
- Observation 2: comparison from Year 15 to subsequent years, the correlation is decreasing as well, however, it’s higher than Observation 1 which is ≈0.75 at Year 25.
- Observation 3: comparison from Year 20 to subsequent years, the correlation decreases, however, it’s higher than Observation 1 and Observation 2 ≈0.9 at Year 25.

Therefore, the pattern can be concluded based on the observation. The closer the base year we used for comparison, to the year of maturity, the higher the correlation.

Question 4

PC1, all the variable has the same direction, however, V1 and V2 has the lowest magnitude, while the rest has a similar magnitude that ranges from 0.1 ~ 0.15.

PC2, the variable V3 to V9 dominates in PC2 with an approximation of the same magnitude in the 0.2 scale, on the other hand, from V23 onwards, it has an opposite direction compared to the previous years.

In PC3, the variable V2 to V5 dominates with the highest magnitude in the positive direction, and in the negative direction, V12 to V24 has highest magnitude.

PC4, the variable V47-V51 dominates with a magnitude of 0.22 to 0.317 with a positive direction, however there is a change of direction from V1 to V38.

Standardisation is not required because transformation is done for data of different scale, however, the data that was given to us, is of the same scale. Hence, transformation is not required. On the other hand, the mean and standard deviation of the change dataset is close to 0 and 1 respectively. This further solidify that the data is standardised, and transformation is not required to standardise the given data.