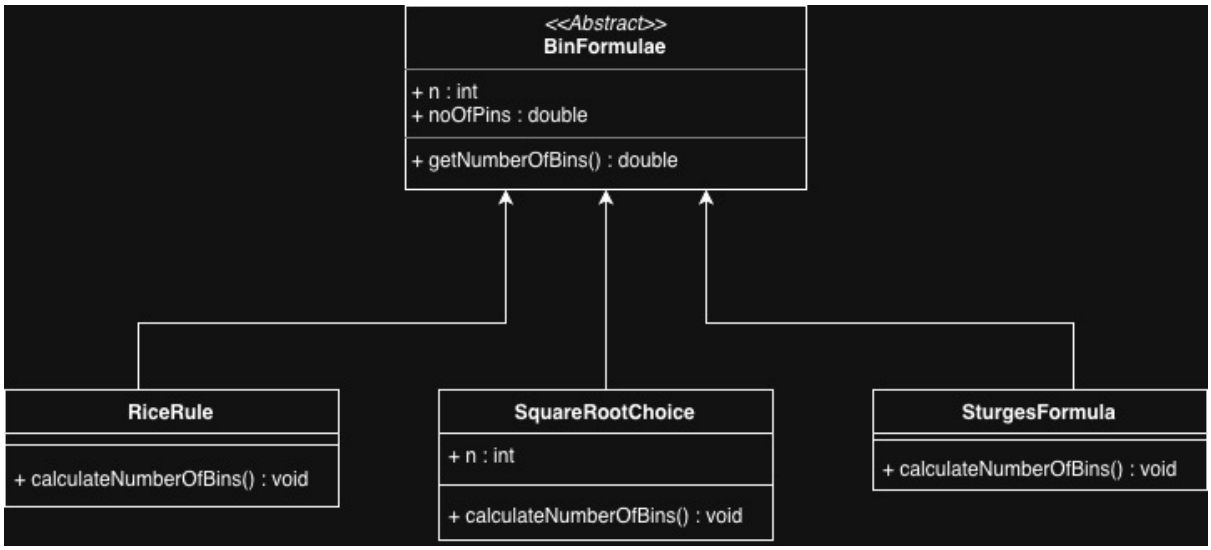
Question 3

Task 3a: Reporting: UML diagram for `binmethod package`.

- **UML class diagram of binmethod exactly as submiged in Part A.**

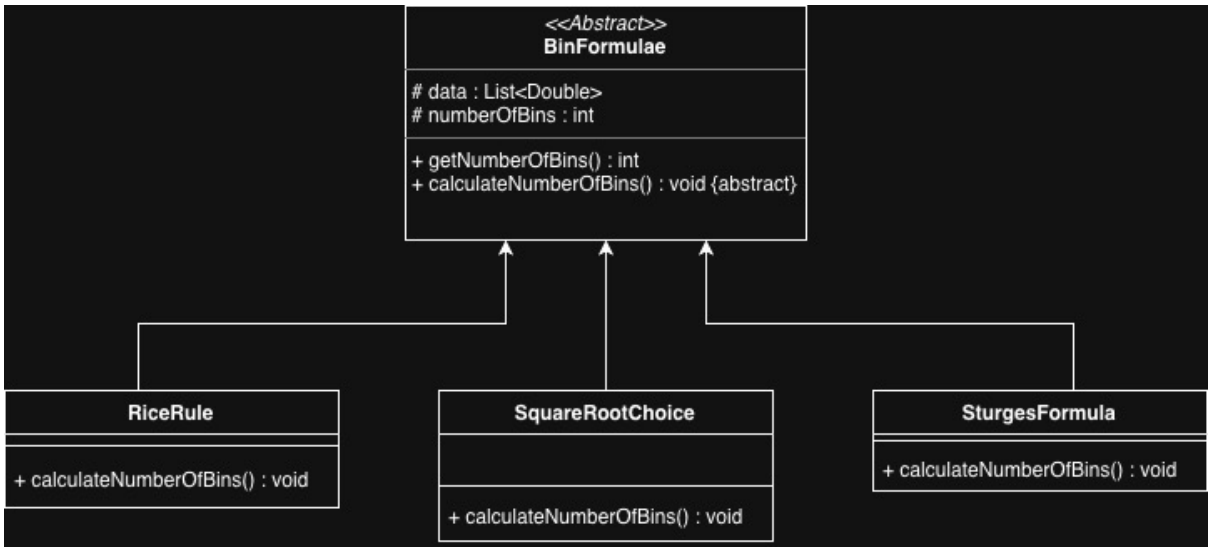


- **A brief (<100 words) note on class roles and key relationships.**

BinFormulae is the abstract class that stores common data and provides a row structure for its child classes, RiceRule, SquareRootChoice, and SturgesFormula. All this classes are extend to BinFormulae and each class has it own bin calculation formule to calculate number of bins. Each chila class takes the sample size through its constructor. Here I have shown that SquareRootChoice class defines its own n variable, which is not necessary, I did it in lab so im showing it here.

- **Updated UML and a short rationale (<100 words) stating what changed and why.**

Yes, the binmethod package was modified to make it work as intended. Its functionality was the same in the abstract BinFormulae class, where initialisation of the sample size through a constructor using proper synatx of List (not using int) and declaration of the calculateNumberOfBins method as abstract. All its child classes also follow this. Re-declaration of n in



SquareRootChoice was removed. Poper use of libary and syntex helped this package to work as intended. Class roles and key relaltionships remain the same as before. Only a few lines of code as been modified.

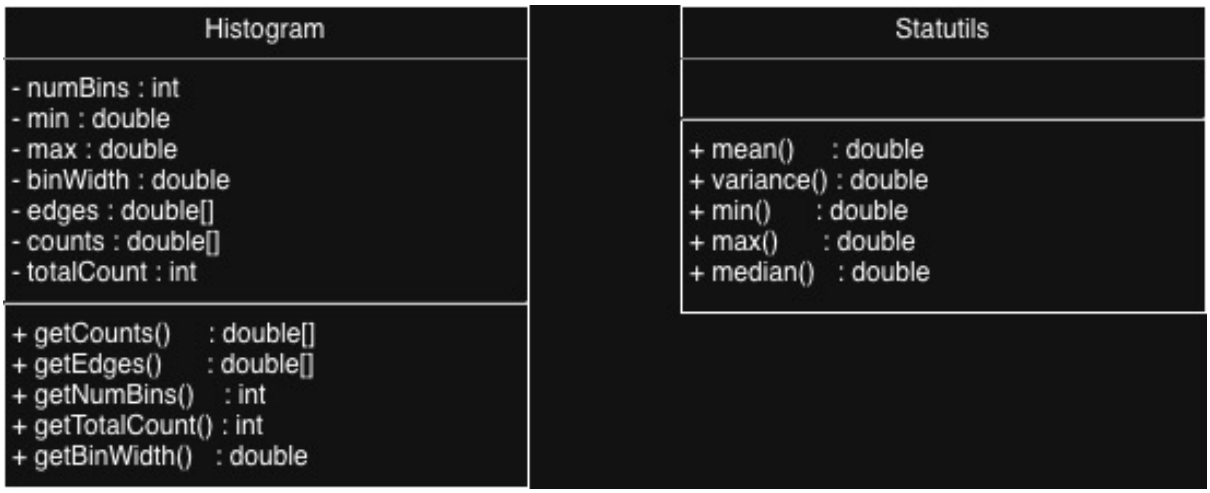
- **AI disclosure.**

Yes, Generative AI was used to review the previous code, understand the question better, and checking where the class needs to be redesigned. The AI has helped me improve the syntax and remove unnecessary variables. It has also helped me understand how to use libraries and see all the functions associated with list.

Author responsibility: All code modifications, design decisions, and final implementations were carried out, verified, and tested by the author. The AI was used strictly as a support tool and did not autonomously generate the final solution.

Task 3b: Reporting: UML diagram for `statutils package`.

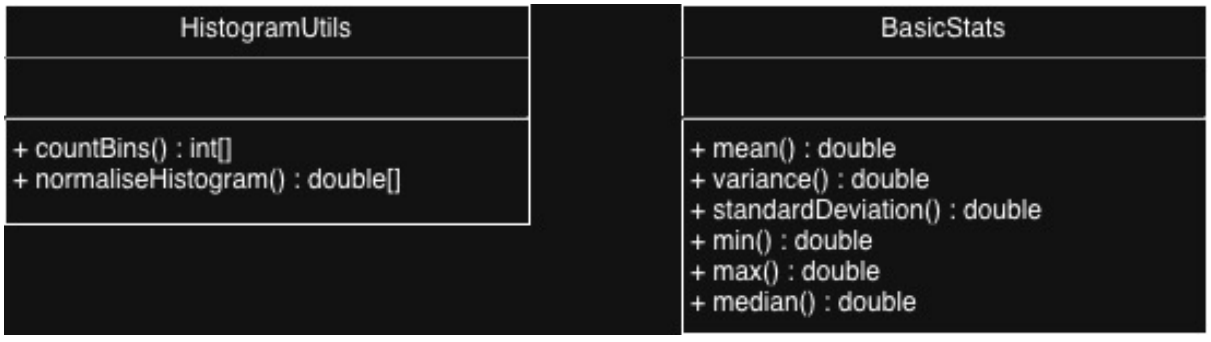
- **Draw a UML class diagram of statutils exactly as submiged in Part A as Task 2a.**



- **A brief (<100 words) note on class roles and key relationships.**

The Histogram class represents a data iin the give list that stores bin edges, bin counts, max, min and all. It calculate everything and use get functions to retrieve it values. On the other hand, The statutils class acts as a Basic class that provides all the methods required for calculating statistical measures such as mean, variance, minimum, maximum, and median. Will use the values from the statutils class in our Histogram class. For example, Max and min, But it is not inheritanced. Here I have only used two classes.

- **Updated UML and a short rationale (<100 words) stating what changed and why.**



I have changed original statutils to BasicStats. which handles all 6 of statistical calculations, and HistogramUtils, which can count the number of samples in each bin and also perform histogram normalisation. This redesign improves the Readability of the code and aline with what is asked in the question. I have also removed the field type from the HistogramUtils so that each funtion represents what is asked, I have maintained the same 2 class design like before. The same relationship exist like before where use values from statutils class in our Histogram class. But which is not inheritanced.

- **AI disclosure.**

Yes I have used generative AI here also as my suport tool to understand the concepts of math fucntion what it means. The AI also helped me to simplify the code even Futher because I had used many type fields and it helped with different approch. It also helped me understand what else need to be done for my coursework and the concepts that have to learn.

Author responsibility: All code modifications, design decisions, and testing were performed and verified by the student. AI was used only for guidance and documentation support.