**List of Bad Smells**

Name: Middle Man

Location: PR301A1-master/ChartOutputController.py

Reasons:  
1. When it’s called it just calls the methods of the graph classes without doing anything else.  
2. Complicates the code for no reason.

Strategies/ approaches: Remove Middle Man. Delete the class and call the graph classes directly from the ChartInputController instead of ChartOutputController.

Name: Long Method

Location: PR301A1-master/BoxPlot.py

Reasons:  
1. Could cause issues due to performing so many functions within one method.  
2. Could easily be split into multiple smaller methods.  
3. Method is too long.

Strategies/ approaches: Extract Method. Split the method into multiple smaller methods

Name: Lazy Class

Location: PR301A1-master/ChartOutputController.py

Reasons:  
1. When it’s called it just calls the methods of the graph classes without doing anything else.  
2. Complicates the code for no reason.

Strategies/ approaches: Inline Class. Delete the class and call the graph classes directly from the ChartInputController instead of ChartOutputController.

Name: Message Chains

Location: PR301A1-master/ChartOutputController.py, PR301A1-master/ChartInputController.py

Reasons:  
1. The classes call series of calls to access methods from other classes.

Strategies/ approaches: Extract Methods. Delete ChartOutputController and call the graph classes directly from the ChartInputController instead of ChartOutputController.

**Refactoring**

1. Wrote 15 Tests
2. All tests passed
3. Bad smells were identified (above)
4. Used GitHub for version control.
5. Priority of smells
   1. Long Method
   2. Middle Man
   3. Lazy Class
   4. Message Chains
6. Worst smell is long method
7. Smell: Long Method  
   Split the method into multiple methods using the extract method.  
   Program is now easier to edit and understand.
8. All tests pass
9. Commited to GitHub
10. Smell: Middle Man  
    Moved some of the code from ChartOutputController into ChartInputController and deleted ChartOutputController.  
    Program is now easier to edit and understand.
11. All tests pass
12. Commited to GitHub
13. Lazy Class and Message Chains bad smells were removed when middle man was fixed.

**Tests**

All tests 15 pass before and after refactoring the code.