### B1 Scientific Coding Report

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Audience

TAs

What motivation?

I provide a PD controller for a submarine to avoid collision.

What did I do?

I created a Python virtual environment called *myenv* as *requirements.txt* by conda. Then, I defined the class called *PDController* in *control.py* by Copilot. In *demo.ipynb*, *Submarine* and *PDController* were tested.

Then I started to modify *dynamics.py*. I changed the class function *simulate()* in *ClosedLoop* to enable the data update. In *Mission*, I opened *mission.csv* from *data* to *uuv\_mission* and substituted the name into the main function.

Explain your design choices: why did you solve the problem the way you did? e.g. Why did you use functions vs classes vs something different?

I chose copilot to build the controller. Classes can help to store many columns of one object, so I used this datatype for the controller and submarine. The methods in the classes enable common functions (e.g. any Submarines can get their position), so repetition is avoided.

Briefly discuss any difficulties you encountered and how you overcame them.

The environment was hard to establish because Conda could not find my virtual environment. I rebuilt a virtual environment to the program file, so Conda finally found it.

My config was not found, but the repository did exist. The file manager did not show *.git* , but I made it visible.

Improvements

There is a slight delay. It may be improved by adjusting the parameters or using a PID controller.