CS 556: Task-Sheet for Lab 3 - Odometry

Name: Colin Treziok & Cameron Lee

Robot ID: 20

Question:	1a Pre-lab	1b Pre-lab	2.1a	2.1b	2.2a	2.2b	2.2c	3.1a	3.2b	3.2c	3.2d	3.2e	3.2f	Total
Points:	5	15	2.5	2.5	5	5	5	15	5	15	5	15	5	100
Score:														

Pre-lab Submission (on Canvas, Due Wednesday, 23:59 PM before lab #3):

- 1) Task-Sheet Pre-lab task (one PDF file: TeamX_LabY_Prelab_Tasksheet.pdf)
- 2) Draft code (one zip folder: TeamX_LabY_DraftCodes.zip)

Post-lab submission (On Canvas, Due Wednesday, 23:59 PM after lab #3) Submit in 3 separate files (do NOT zip these four together):

- 1) Task-Sheet tasks (one PDF file: TeamX_LabY_Postlab_Tasksheet.pdf).
- 2) Final code (one ZIP folder: TeamX_LabY_FinalCodes.zip).
- 3) Videos (one zip folder: TeamX_LabY_Videos.zip).

Lab Grading Criteria:

- Every member of the team must submit the same set of final materials for the post-lab to receive a grade.
- For the pre-lab submissions, no extensions will be offered. Failure to prepare for the lab will result in a 20% deduction from your total grade for that week's lab.
- For the post-lab submissions, late work or post-lab submissions will incur a 20% penalty per day, up to a maximum deduction of 100%.
- Lab attendance is mandatory – a missed lab will mean 0 points for you.
- Before you leave, make sure you return all robots and tools used to the front desk in the same format that you received them. If not done so, 10 points will be deducted.
- Your code must follow the industry guidelines for coding; if not done so, 10 points will be deducted. Comment out code for easy review, add new code below, and label each task with clear, descriptive comments. Ensure a modular, well-structured

design with meaningful names, minimal globals, and avoid hardcoding values.

1. **Prelab**
   - **a.** (5 points) To be completed prior to lab: Based on the lecture slides and the 3pi+ robot dimensions documentation found in task 3, write down important parameters you think you will need in this lab

Some important parameters that I think we will need in this lab will be the diameter of the wheels which is 3.2 cm, the wheelbase which is 9.6 cm, the gear ratio of 75 and the encoder counts of 12.

   - **b.** (15 points) To be completed prior to lab: Implement the draft code for Odometry class (Task 3)

2. Encoders

2.1

a. (2.5 points) Moving forward for 1 meter:
Left Encoder: 8176 Right Encoder: 8160

b. (2.5 points) Moving backward for 1 meter:

Left Encoder: -8021 Right Encoder: -8105

2.2

Motion	Left Encoder	Right Encoder
a. (5 points) Forward 1 m	7603	7587
b. (5 points) Backward 1 m	-7344	-7408
c. (5 points) Turning Left 90 degrees	-668	688

3. Odometry

3.2 Test Odometry while Moving

a. (15 points) Odometry in a straight line [Video]
b. (5 points) How well does the robot's calculated position match the commanded position? What is the error rate? Discuss possible sources of error.

The calculated final x position for 1189 mm when we wanted it to 1500 mm leading to a 21% error rate. Some possible sources of error would be for the speed of the robot, we have noticed with ours that the left motor goes a little bit slower so than what we set and needed to compensate. Additionally we don't know if the setspeed function is perfect and there could probably be a bit of variance with the motors.

c. (15 points) Odometry in a square clockwise [Video]
d. (5 points) How well does the robot's calculated position match the commanded position? Discuss possible sources of error.

For our final calculated position we got -45.6 and -54 for the x and the y so we ended a bit off diagonally from where we started. This could be due to a bit of drift we experience when the robot moves in a straight line, plus it probably is not turning exactly 90° leading to it being a bit off.

e. (15 points) Odometry in a square counterclockwise [Video]
f. (5 points) How well does the robot's calculated position match the commanded position? Discuss possible sources of error.

For our final calculated position on this one we got -53.8 and 96.2 for our x and y which was a larger difference compared to when turning clockwise. This could be seen for the same reasons and for the error with clockwise, however when looking at the video it seemed the turning seemed to be a bit more off compared to when we turned clockwise making a larger error.