

# Homework No. 04B (Spring 2022)

## PHYS 205A-001: University Physics

Due date: Friday, 2022 Feb 11, Noon, on D2L

### Instructions

- To the extent to which you depend on resources to complete this homework is a measure of how much extra work you need to put in to master the related concepts. Solutions are available at <http://sphics.com/tc/202101-SIU-P205A/>.
- Describe your thought process in detail and organize it clearly. Make sure your answer has the correct units and the right number of significant digits.
- After completion, scan the pages as a single PDF file, and submit the file on D2L (under Assessments → Assignments).

### Problems

1. **(10 points.)** A boat is able to move through still water at  $20.0\text{ m/s}$ . It makes a round trip to a town  $3.0\text{ km}$  downstream. Assume all motion to be along a straight line. That is, the boat first travels in the direction of river and while returning travels against the direction of river. If the river flows at  $5.0\text{ m/s}$ , determine the time required for this round trip.
2. **(10 points.)** A car travels due east with a speed of  $40.0\text{ km/h}$ . Raindrops are falling at a constant speed vertically with respect to the ground. The traces of the rain on the side windows of the car make an angle of  $76.0^\circ$  with the vertical.
  - (a) Find the speed of the rain with respect to the ground.
  - (b) Find the speed of the rain with respect to the car.
3. **(10 points.)** The wind is flowing at a speed of  $20\text{ m/s}$  in the direction  $30^\circ$  North of West with respect to the ground. Determine the direction and speed of the aeroplane should head (with respect to the wind) such that the aeroplane heads North (with respect to the ground) with speed  $80.0\text{ m/s}$ .