Physics 314 – Homework set 1 ("warmup homework set")

(Date: Friday, Apr. 03, 2009)

Problem 1 – 2 pts.: The width of a river is L = 0.25 mile. The current speed (same everywhere) is u = 2.16 km/h (km/h \equiv kilometer per hour). A swimmer swims in standing water with a constant speed of c = 1 m/s. Find the time the swimmer needs for:

- 1. Swimming "cross-stream" from one bank to the other, and then returning to the point of departure along the same line;
- 2. Swimming a distance L upstream, and then returning to the point of departure downstream;
- 3. Like in the preceding item but swimming downstream first, and then returning upstream.

Pay attention to **units**, please!

Problem 2 – 1 pt. On Slide 4 in the Power Point file "Notes_01.ppt" (click on "Lecture Notes" in the course Web Page) there is a plot of a 3D coordinate system with a point labeled as Q, with coordinates (-5,-5,7). Find the (a) spherical polar coordinates, and (b) cylindrical coordinates of this point.

Problem 3 - **1 pt.** Two friends go to a rowboat trip down the Willamette river. One of them has a broken arm in a sling, so he cannot row – his friend has to row all the time. They have a lunch box packed with delicious snacks. It is a special lunch box for boaters – it's of a bright-orange color, it floats in water, and has a waterproof cover, so if it falls overboard, it can be easily retrieved, and the food will not be damaged.

The friend with a broken arm likes so-called "practical jokes". So, when the lunch time is near, and his friend looks the other way, he lifts the lunch box and, making no splash, he lowers it into the water overboard.

Ten minutes later, the other friend says: "I think it's time for lunch". And the prankster says: "I dropped the lunch box overboard ten minutes ago, we have to turn around and you have to row upriver until we get back to it".

The rowing friend makes a "U-turn" and he starts going upriver. He is not very hungry, so he keeps rowing with exactly the same energy as before.

So, ten minutes elapsed until the boat was turned around, and started heading back to the floating lunch box. How much time it took to get back to the lunch box?

Hint: Try to solve this problem by pure reasoning, without writing anything on paper.