Physics 10154 – Exam #1B

Partial credit will be given provided you show all work and are solving parts of the problem correctly. Points will be deducted if you don't show your work (or if some parts are incorrect) even if you get the right answer. Clearly indicate your answer with a circle or box and remember to include correct units and significant figures.

1. (30 pts) A boat crossing a wide body of water is attempting to get to a small island that is 357 miles due West from its initial location. The boat travels 192 miles in a direction 15.0° North of West, then 218 miles in a direction 27° South of West. What must the final straight line displacement of the boat be in order to find the island?

2. (35 pts) A person standing on a cliff fires a pellet gun A straight down toward the ground with an initial speed of 20.8 m/s. Pellet A hits the ground 1.62 seconds after it was fired.

If a second identical pellet gun B fires a pellet upward with a speed of 20.8 m/s at the same time as pellet A is fired downward, how many seconds after pellet A hits the ground does pellet B hit the ground?

3. (35 pts) A rocket is fired at a speed of 53.0 m/s from
ground level, at an angle of 61.0° above the horizontal. You may
assume the rocket is in free fall for the entire problem. The
rocket is fired toward a 72.0-meter high wall, located 42.5
meters away horizontally from the launch point.

a) Does the rocket get over the wall or hit the wall?
b) By how many meters does the rocket miss the top of the wall?
c) What is the rocket's velocity when it reaches maximum height?