Midterm Exam 01 (2018 Fall)

PHYS 203A-002: College Physics

Date: 2018 Sep 18

(Name) (Signature)

Instructions

1. Seating direction: Please be seated on seats with seat numbers divisible by 3.
2. Total time = 75 minutes.
3. There are 8 questions in this exam.
4. Equation sheet is provided separately.
5. To be considered for partial credit you need to show your work in detail and organize it clearly.
6. A simple calculator (with trigonometric functions) is allowed.
7. Use of mobile phones is strictly prohibited. It should stay out of reach during the exam.

1. (**10 points.**) Starting from campground A one cyclist rides 1500 m due East and then turns due North and travels another 1430 m before reaching another campground B. Find the magnitude and direction of the displacement of the cyclist.

2. (**10 points.**) A golfer, putting on a green, requires three strokes to putt the ball into the hole. During the first putt, the ball rolls 5.0 m due East. For the second putt, the ball travels 2.5 m at an angle 20° South of East. The third putt is 0.50 m due South. What displacement (magnitude and direction relative to due East) would have been needed to put the ball into the hole on the very first putt?

3. (**10 points.**) Standing on the ground you throw a stone vertically up. Neglect air resistance.

   (a) What is the velocity of the stone when it is at the highest point?

   (b) What is the acceleration of the stone when it at the highest point?

4. (**10 points.**) A ball is thrown vertically upward at a speed of $v_i = 15\,\mathrm{m/s}$. How high above does the stone reach? Neglect air resistance.

5. (**10 points.**) A speeder passes a parked police car at 40.0 m/s. The police car starts from rest with a uniform acceleration of 3.0 m/s^2. How far does the speeder get before being overtaken by the police car?

6. (**10 points.**) A small fish is dropped by a pelican that is rising steadily at 2.0 m/s when it is 50.0 m above the ground. How much time later does the fish hit the water?

7. (**10 points.**) A horizontal rifle is fired at a bull's-eye. The muzzle speed of the bullet is 750 m/s. The gun is pointed directly at the center of the bull's-eye, but the bullet strikes the target 0.025 m below the center. What is the horizontal distance between the end of the rifle and the bull's-eye?

8. (**10 points.**) A train (T) travels at 20.0 m/s relative to the ground (G) in rain (R). The path of each raindrop is vertically downward, as measured by an observer stationary on the ground. An observer on the train, however, sees the drops falling at an angle 70° with respect to the vertical. Determine the speed of the raindrops relative to the ground.