

CLASS: PHY _____

STUDENT #: _____

NAME: _____

Assignment 1: KINEMATICS 1-D Motion

Assigned: Sept 9 14:30 Due: September 16 19:00

- 1 A ferry boat transports tourists among three islands. It sails from the first island to the second island, 4.76 km away, in a direction 37.0° north of east. It then sails from the second island to the third island in a direction 69.0° west of north. Finally it returns to the first island, sailing in a direction 28.0° east of south. Calculate the distance between
(a) the second and third islands (2p) (b) the first and third islands. (2p)

- 2 A particle initially located at the origin has an acceleration of $\mathbf{a} = 3.00\hat{\mathbf{j}} \text{ m/s}^2$ and an initial velocity of $\mathbf{v}_i = 5.00\hat{\mathbf{i}} \text{ m/s}$. Find (a) the position vector and velocity vector at any time t and (b) the coordinates of position vector at $t=2\text{s}$ (c) the velocity vector coordinates and magnitude at 2s (4p)
- $\mathbf{a} = 3.00\hat{\mathbf{j}} \text{ m/s}^2$; $\mathbf{v}_i = 5.00\hat{\mathbf{i}} \text{ m/s}$; $\mathbf{r}_i = 0\hat{\mathbf{i}} + 0\hat{\mathbf{j}}$

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3 A rock is dropped from rest into a well. The sound of the splash is heard 2.40 s after the rock is released from rest. (a) How far below the top of the well is the surface of the water? The speed of sound in air (at the ambient temperature) is 336 m/s. (3p) (b) **What If?** If the travel time for the sound is neglected, what percentage error is introduced when the depth of the well is calculated? (1p)

4. The height of a helicopter above the ground is given by $h = 3.00t^3$, where h is in meters and t is in seconds. After 2.00 s, the helicopter releases a small mailbag. How long after its release does the mailbag reach the ground? (4p)

5 Speedy Sue, driving at 30.0 m/s, enters a one-lane tunnel. She then observes a slow-moving van 155 m ahead traveling at 5.00 m/s. Sue applies her brakes but can accelerate only at -2.00 m/s^2 because the road is wet. Will there be a collision? If yes, determine how far into the tunnel and at what time the collision occurs. If no, determine the distance of closest approach between Sue's car and the van. (4p)