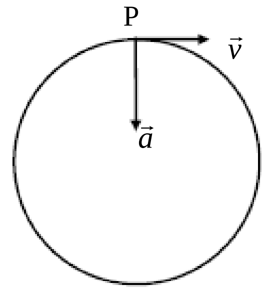
PHYS 101

Homework # 3
DUE DATE: October 14, 2008

Please do not submit copycat answers from the solutions book or some other solution you have in hand. You should at least show your understanding of the problem. Otherwise, this will be considered as cheating.

1) Two swimmers, Alan and Beth, start together at the same point on the bank of a wide stream that flows with a speed v. Both move at the same speed $c(c > v)$, relative to the water. Alan swims downstream a distance L and then upstream the same distance. Beth swims so that her motion relative to the Earth is perpendicular to the banks of the stream. She swims the distance L and then back the same distance, so that both swimmers return to the starting point. Which swimmer returns first?

2)



When a particle moves around a circular path with constant speed, its acceleration has a constant magnitude and is at any instant directed perpendicular to its velocity toward the center of the circle. Is the rate of change of of the particle's acceleration at the point P ($\frac{d\vec{a}}{dt}$) zero or not? If it is not zero, specify the direction of the change, and find the magnitude as a function of v and r.

3) Discussion Questions 3.4, 3.11, 3.16,3.17 in the text. Chapter 3.

4) Problem 3-76 in the text. Chapter 3.,

5) Problem 3-80 in the text. Chapter 3.

6) Problem 3-82 in the text. Chapter 3.

7) Problem 3-86 in the text. Chapter 3.

8) A football kicker can give the ball an initial speed of v. Within what two elevation angles must he kick the ball to score a field goal from a point at a distance L to the front of goalposts whose horizontal bars is at a height h above the ground?
(Hint use $\cos^2\theta + \sin^2\theta = 1$ to get a relation between $\tan^2\theta$ and $\frac{1}{\cos^2\theta}$, substitute, and then solve the quadratic equation)