PHYS 111 K

HOMEWORK #3

Due : 15 September 2015

1. Consider the curves for the functions f (x) = x^2, x^3, x^4. Use the definition of slope:

$$\text{slope} = \frac{\Delta f}{\Delta x}$$

to compute the slopes of each curve at x = 2, setting Δx = 0.1, 0.01, 0.001. In other words, this problem involves performing nine slope calculations, three for each of the given functions, using three different values of Δx for each. Compare your computed values of slope with the results you would get by evaluating the derivatives of these functions at x = 2. (Remember, if f (x) = x^n, $\frac{df(x)}{dx} = n\, x^{n-1}$

2. p. 77/#68

3. Use the expression for velocity given in problem 80 (on p. 68) and compute the acceleration of the runner at t = 1, 2, and 5 s. You may use methods of calculus if you know them; if not, use the techniques described in problem 1 of this assignment.

4. #64/p. 67 (all parts)

5. A person walks in the following pattern : a) 3.1 km north; b) 2.4 km west; c) 5.2 km south. How far and in what direction would a bird fly in a straight line from the same starting to the same ending point?

6. Consider a wheel of radius 45 cm that rolls without slipping on a flat surface. At time t_1 the point P (shown in red on the wheel) is the point of contact with the surface. At a later time, t_2, the wheel has rolled through exactly one half of a revolution, so that the point P is now at the highest point on the wheel. What are the magnitude and angle (relative to the floor) of the displacement of P?

Out[86]=