Next hour exam is Friday Nov 9 (next Fri)

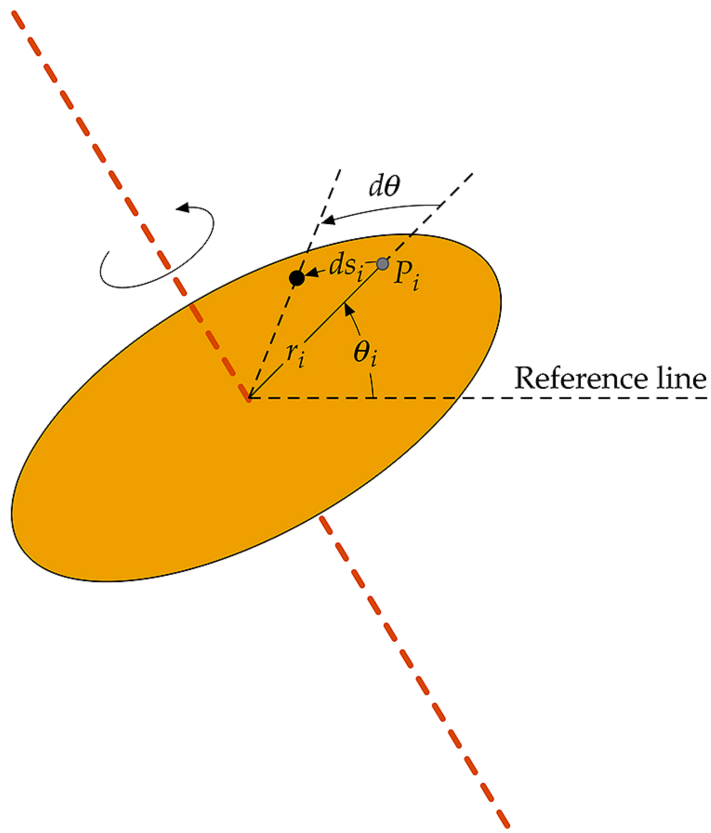
Homework is due Wed Nov 7, and is posted on Tycho.

Wed we will review the material for the exam and go over homework problems.

Office hours will be Wed (usual 4-5:30pm) and Thursday (4-5:50pm) not Friday.

Chapter 9 Rotation Section 1 kinematics
Angular velocity and acceleration

Polar coordinates:
Axis goes thru the origin, perpendicular to a plane. Coordinates on the plane given by r and θ



Angles measured in radians = s/r
2π radians is a full circle.
Angle is dimensionless (even though we have degrees, radians, and whatever.)

dθ is not length.   length element is r dθ.
It is perpendicular to r,
and the direction of r   depends on θ.

Angular speed: $\omega = d\theta/dt$ **so $\omega = 2\pi$ is 1 rev/s**

Units of angular speed are 1/s but rad/s is ok and even clearer if angular "unit" is not clear.

Angular acceleration, naturally $\alpha = d\omega/dt$

You can divide all the linear kinematic equations by r to get the corresponding angular ones

$\Delta x = v_x \Delta t \rightarrow \Delta s = v_t \Delta t$ **for circular motion**

$\Delta s = v_t \Delta t \rightarrow \Delta\theta = \omega \Delta t$ **const (angular) speed**

$v = v_0 + at \rightarrow \omega = \omega_0 + \alpha t$ **const (angular) accel**

$$s = s_0 + v_t t + \frac{1}{2}at^2 \rightarrow \theta = \theta_0 + \omega t + \frac{1}{2}\alpha t^2$$

$$v_f^2 = v_i^2 + 2a\Delta s \rightarrow \omega_f^2 = \omega_i^2 + 2\alpha\Delta\theta$$

Linear speed of a point on a thing going around:

$$v = r\frac{d\theta}{dt} = r\omega.$$

Linear velocity of a point is this magnitude pointing perpendicular to $\hat{r}$ at the point.

And centripetal acceleration at a point is

$$a_c = \frac{v^2}{r} = \omega^2 r.$$