PHYS 2211K, preparation for Test 1, relations to know how to use properly

Rectilinear equations of motion:

$\vec{\boldsymbol{r}} = \vec{\boldsymbol{r}}\boldsymbol{(t)} = x(t)\hat{\boldsymbol{i}} + y(t)\hat{\boldsymbol{j}} + z(t)\hat{\boldsymbol{k}}$ *(the position is a function of time)*

$\vec{\boldsymbol{v}}\boldsymbol{(t)} = \dfrac{d\vec{\boldsymbol{r}}}{dt}$ *(velocity is the rate of change of position)*

$\vec{\boldsymbol{a}}\boldsymbol{(t)} = \dfrac{d\vec{\boldsymbol{v}}}{dt}$ *(acceleration is the rate of change of velocity)*

etc.

For constant acceleration, these lead to :

$x(t) = x_0 + v_{x0}t + \frac{1}{2}a_x t^2$

$y(t) = y_0 + v_{y0}t + \frac{1}{2}a_y t^2$

$z(t) = z_0 + v_{z0}t + \frac{1}{2}a_z t^2$

$v_f^2 = v_0^2 + 2ad$

Corresponding rotational equations of motion:

$\theta = \theta(t)$ *(the angular position is a function of time)*

$\omega(t) = \dfrac{d\theta}{dt}$ *(angular velocity is the rate of change of angular position)*

$\alpha(t) = \dfrac{d\theta}{dt}$ *(angular acceleration is the rate of change of angular velocity)*

For constant angular acceleration, these lead to :

$\theta(t) = \theta_0 + \omega_0 t + \dfrac{1}{2}\alpha t^2$

$\omega_f^2 = \omega_0^2 + 2\alpha\theta$

For uniform circular motion:

$a = \dfrac{v^2}{r}$, towards the center of the circle (centripetal)