Quaternion

Angular velocity from quaternion.

$$\dot{q} = \frac{dq}{dt} = \frac{1}{2}\omega q_t$$

$$\omega = 2\frac{dq}{dt}\overline{q}_t$$

$$(0, \vec{\omega}) = 2\frac{dq}{dt}\overline{q}_t = 2\frac{(q_t - q_{t-1})}{dt}\overline{q}_t$$

Quaternion from angular velocity.
First order method:

$$M = 1 + \frac{dt}{2}\vec{\omega}$$

$$\Lambda_{t+1} = \Lambda_t M$$

After this step normalization is required.
72 l = 0i + 0.265923j + 0k + 0.963994 norma 1
Second order method:

$$M = 1 - \frac{|\vec{\omega}|^2 dt^2}{12} + \frac{dt}{2}\vec{\omega}$$

$$\Lambda_{t+1} = \Lambda_t M$$

After this step normalization is required.
72 l = 0i + 0.28289j + 0k + 0.959153 norma 1