Parametrics

Day 4
Integration of Vector Functions
AND QUIZ

What would we do?

$$\int (\sec t \tan t)\,\mathbf{i} + \sec^2 t\ \mathbf{j}\ dt$$

Very simple

IF we remember that the ONLY variable involved is *t* !

Understanding C

$$\int (\sec t \tan t)\,\mathbf{i} + \sec^2 t\ \mathbf{j}\ dt$$

$$= \sec t\ \mathbf{i} + \tan t\ \mathbf{j} + C$$

C is a **vector,** not just a number.

This one??

$$\int_0^{\pi} \cos t\ \mathbf{i} - 2t\ \mathbf{j}\ dt$$

Given the following velocity vector function find the position vector function *r(t)*

$$v(t) = (\cos t)\mathbf{i} - 2t\mathbf{j}$$

$$r(t) = \int (\cos t)\mathbf{i} - 2t\,\mathbf{j}\ dt$$

Now that we have the GENERAL position vector function we can find the SPECIFIC position vector function that satisfies the given condition:

$$r\left(\frac{\pi}{2}\right) = 3\mathbf{i} + \frac{3\pi^2}{4}\mathbf{j}$$

$$r(t) = \int (\cos t)\mathbf{i} - 2t\,\mathbf{j}\ dt = (\sin t)\mathbf{i} - t^2\mathbf{j} + C$$

Practice….
Solve the initial value problem.

$$\frac{d^2r}{dt^2} = -2\mathbf{i} - 2\mathbf{j}, \quad \left.\frac{dr}{dt}\right|_{t=1} = 4\mathbf{i}, \quad \mathbf{r}(1) = 3\mathbf{i} + 3\mathbf{j}$$

QUIZ