

$$7) \quad r(t) = ? \quad v(t) = ? \quad a(t) = 2t\mathbf{i} - 5\mathbf{j} \quad v(0) = 3\mathbf{i} - 2\mathbf{j} \\ r(0) = \mathbf{i} + \mathbf{j}$$

$$1) \quad \int (2t\mathbf{i} - 5\mathbf{j}) dt$$

$$(t^2 + c)\mathbf{i} + (-5t + c)\mathbf{j} = v(t)$$

$$(0^2 + c)\mathbf{i} + (-5 \cdot 0 + c)\mathbf{j} = v(0) = 3\mathbf{i} - 2\mathbf{j}$$

$\downarrow \qquad \qquad \qquad \downarrow$   
 $3 \qquad \qquad \qquad -2$

$$\text{So } v(t) = (t^2 + 3)\mathbf{i} + (-5t - 2)\mathbf{j}$$

$$11) \quad \int (t^2 + 3) dt \mathbf{i} + \int (-5t - 2) dt \mathbf{j}$$

$$r(t) = \left( \frac{1}{3}t^3 + 3t + c \right) \mathbf{i} + \left( -\frac{5}{2}t^2 - 2t + c \right) \mathbf{j}$$

$$\Rightarrow r(0) = (0 + 0 + c)\mathbf{i} + (-0 - 0 + c)\mathbf{j} = \mathbf{i} + \mathbf{j}$$

$\downarrow \qquad \qquad \qquad \downarrow$   
 $= 1 \qquad \qquad \qquad = 1$

$$r(t) = \left( \frac{1}{3}t^3 + 3t + 1 \right) \mathbf{i} + \left( -\frac{5}{2}t^2 - 2t + 1 \right) \mathbf{j}$$