

Operador Oscarie Yoma SN: 65

Computer Engineering 19/ENGO2/051

MAT 102

$$1) \mathbf{r} = (8t^3)\mathbf{i} + (4t^3 - 7t)\mathbf{j} + (t+3)\mathbf{k}$$

$$\cdot \text{Velocity} = \frac{d\mathbf{r}}{dt} = 24t^2\mathbf{i} + (12t^2 - 7)\mathbf{j} + (1)\mathbf{k}$$

$$\text{Acceleration} = \frac{d^2\mathbf{r}}{dt^2} = 48t\mathbf{i} + 24t\mathbf{j} + 0$$

$$2) x = 3t, y = t^3, z = t^2$$

$$\mathbf{r} = 3t\mathbf{i} + t^3\mathbf{j} + t^2\mathbf{k}$$

$$\frac{d\mathbf{r}}{dt} = 3\mathbf{i} + 3t^2\mathbf{j} + 2t\mathbf{k}$$

$$\text{at } t = 1$$

$$\therefore \frac{d\mathbf{r}}{dt} = 3\mathbf{i} + 3\mathbf{j} + 2\mathbf{k}$$

$$\left| \frac{d\mathbf{r}}{dt} \right| = \sqrt{3^2 + 3^2 + 2^2}$$

$$= \sqrt{9 + 9 + 4} = \sqrt{22}$$

$$\hat{\mathbf{T}} = \frac{\frac{d\mathbf{r}}{dt}}{\left| \frac{d\mathbf{r}}{dt} \right|} = \frac{3\mathbf{i} + 3\mathbf{j} + 2\mathbf{k}}{\sqrt{22}}$$