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Math 402 Assignment

10) Velocity along Curve 2

$$x = 8t^3$$

$$x = 8(3)t^2$$

$$x = 24t^2$$

11) Acceleration

$$x = 24t^2$$

$$x = 24(2)t$$

$$x = 48t$$

$$y = 4t^3 - 7t$$

$$y = 4(3)t^2 - 7$$

$$y = 12t^2 - 7$$

acceleration

$$y = 12t^2 - 7$$

$$= 12(2)t - 7$$

$$= 24t - 7$$

$$z = t + 3$$

velocity along z
 $z = 1$

acceleration

$$z = 1$$

$$z = 0$$

2D Given

$$\vec{r}(t) = 3t\mathbf{i} + t^3\mathbf{j} + t^2\mathbf{k} \text{ at } t=1$$

$$\text{Tangent vector} = \vec{v}(t) = 3\mathbf{i} + 3t^2\mathbf{j} + 2t\mathbf{k} \text{ at } t=1$$

$$\vec{v}(1) = 3\mathbf{i} + 3\mathbf{j} + 2\mathbf{k}$$

$$\vec{v}(1) = 3\mathbf{i} + 3\mathbf{j} + 2\mathbf{k}$$

$$\text{Tangent vector} = \langle 3, 3, 2 \rangle$$

Finding the unit tangent vector

$$\text{We have } = v$$

$$\text{Magnitude/Length} = |v|$$

$$\text{Magnitude/Length} = \sqrt{3^2 + 3^2 + 2^2}$$

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

$$\text{With tangent vector} = \frac{\langle 3, 3, 2 \rangle}{\sqrt{22}}$$

$$\text{by splitting} = \frac{3}{\sqrt{22}}, \frac{3}{\sqrt{22}}, \frac{2}{\sqrt{22}}$$

using rationalisation, we have

$$\frac{3\sqrt{22}}{\sqrt{22} \times \sqrt{22}}, \frac{3\sqrt{22}}{\sqrt{22} \times \sqrt{22}}, \frac{2\sqrt{22}}{\sqrt{22} \times \sqrt{22}}$$

$$= \frac{3\sqrt{22}}{22}, \frac{3\sqrt{22}}{22}, \frac{2\sqrt{22}}{22}$$