

MAT 102 Assignment

Answers

$$1.) \quad r = x_i + y_j + z_k$$
$$r = (8t^3)_i + (4t^3 - 7t)_j + (t+3)_k$$

$$i.) \quad \text{Velocity} = \frac{dr}{dt}$$

$$\Rightarrow 24t^2 i + (12t^2 - 7)j + k$$

$$ii.) \quad \text{Acceleration} = \frac{d^2 r}{dt^2}$$

$$\Rightarrow 48t i + 24t j + k$$

$$2.) \quad r = x_i + y_j + z_k$$

$$r = 3t i + t^3 j + t^2 k$$

$$\frac{dr}{dt} = 3i + 3t^2 j + 2t k$$

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

$$\frac{dr}{dt} = 3i + 3j + 2k$$

$$\left| \frac{dr}{dt} \right| = \sqrt{(3)^2 + (3)^2 + (2)^2} = \sqrt{22}$$

$$\underline{T} = \frac{dr/dt}{\left| \frac{dr}{dt} \right|} \Rightarrow \frac{3i + 3j + 2k}{\sqrt{22}}$$