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COMPUTER ENGINEERING

MAT 102

i) $x = 8t^3$, $y = 4t^3 - 7t$, $z = t + 3$

i) velocity = $\frac{dr}{dt}$

$$r = xi + yj + zk$$

$$r = 8t^3i + (4t^3 - 7t)j + (t + 3)k$$

$$\frac{dr}{dt} = 24t^2i + (12t^2 - 7)j + k$$

ii) Acceleration $\left(\frac{d^2r}{dt^2}\right) = 48ti + 24tj$

2) $T = \frac{dr/dt}{|dr/dt|}$

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

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

$$at \quad t = 1$$

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

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

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

$$\left|\frac{dr}{dt}\right| = \sqrt{22}$$

$$T = \frac{3i + 3j + 2k}{\sqrt{22}}$$