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19/ENG03/017

MAT 102 Assignment

1 $r = xi + yj + zk$

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

i Velocity $= \frac{dr}{dt}$

$dr/dt = 24t^2 i + (12t^2 - 7)j + k$

ii Acceleration $= \frac{d^2r}{dt^2}$

$\therefore \frac{d^2r}{dt^2} = 48ti + 24tj + k$

2 $r = xi + yj + zk$

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

Velocity $dr/dt = 3i + 3t^2j + 2tk$

$\left.\frac{dr}{dt}\right|_{t=1} = 3i + 3(1)^2j + 2(1)k$

$= 3i + 3j + 2k$

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

$= \sqrt{22}$

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