

Assignment

1. $x = 8t^3$, $y = 4t^3 - 7t$, $z = t + 3$
 $\hat{r} = xi + yj + zk$
 $\hat{r} = 8t^3i + (4t^3 - 7t)j + (t + 3)k$

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

ii. Acceleration $= \frac{d^2r}{dt^2} = 48ti + 24tj + 0k$

2. $x = 3t$, $y = t^3$ and $z = t^2$

$r = xi + yj + zk$

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

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

at $t = 1$

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

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

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