2) $x = 3t$, $y = t^3$ and $z = t^2$ at $t = 1$

$$T = \frac{dr/dt}{|dr/dt|} \quad \therefore \quad r = \boxed{xi + yj + zk}$$

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

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

At $t = 1$ $\therefore$ $|dr/dt| = \sqrt{(3)^2 + (3)^2 + (2)^2} = \sqrt{22}$

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

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1) $x = 8t^3$, $y = 4t^3 - 7t$ and $z = t + 3$
where t = time.

(i) velocity $r = 8t^2 i + (4t^3 - 7t) j + (t+3)k$

$\therefore \frac{dr}{dt}$ (velocity) $= 24t^2 i + (12t^2 - 7) j + (1)k$.

$\therefore$ velocity $= 24t^2 i + (12t^2 - 7) j + k$ //

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

Acceleration $= 48ti + 24tj$ //