

$$\mathbf{T}'(1) = \frac{1}{\sqrt{14}} \langle 1, 2, 3 \rangle.$$

b)(7 points) Find the parametric equation for the tangent line to $\vec{r}(t)$ at $t = 1$.

A parallel directional vector is:

$$\mathbf{r}'(1) = \langle 1, 2, 3 \rangle,$$

and a point at

$$t = 1 \text{ is } (1, 1, 1).$$

So parametric equations of the line are given by:

$$\begin{aligned}x - 1 &= t, \\y - 1 &= 2t, \text{ and} \\z - 1 &= 3t.\end{aligned}$$

Thus parametric equations of the line are just:

$$\begin{aligned}x &= 1 + t, \\y &= 1 + 2t, \text{ and} \\z &= 1 + 3t.\end{aligned}$$