



For the vector-valued function

$\vec{r}(t) = \langle 4 \cos(\pi t), 4 \sin(\pi t), t \rangle$, find

1. the unit tangent vector $\vec{T}(t)$ at $t = 0$
2. the principal unit normal vector $\vec{N}(t)$ at $t = 0$
3. Check to make sure $\vec{T}(0)$ and $\vec{N}(0)$ are orthogonal and have length 1.
4. Find the tangential and normal components of acceleration