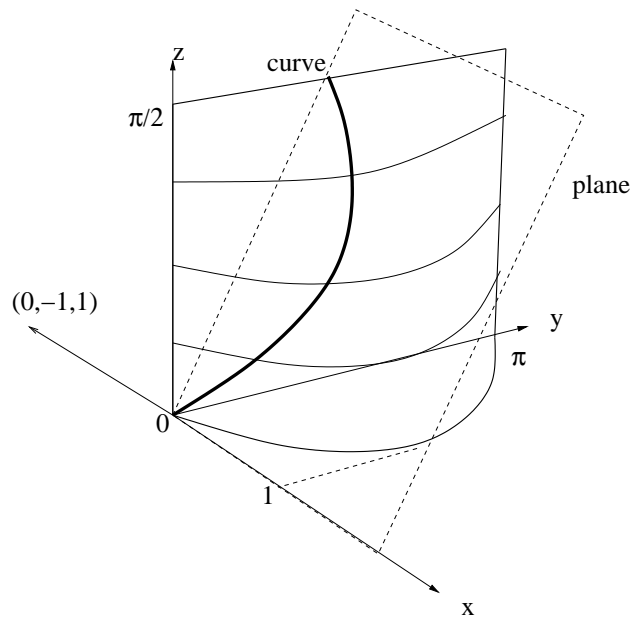


V63.0123-1 : Calculus III. Sample Midterm1 - Answers

I may have made slips. Please email me if questions on how to do.

- $t = 4/3$ gives location $(11/3, -1/3, -1/3)$
 - $\theta = \pi/2 - \cos^{-1}(1/2) = \pi/2 - \pi/3 = 30^\circ$.



- $\mathbf{r}(t) = (\frac{1}{2} \sin(2t), t, t)$.
- $\kappa = 2a$. Normal vector points up positive y axis, *i.e.* $(0, 1, 0)$.
- $y = x/2$, b) 15
- velocity $(r(1 - \cos \theta), r \sin \theta)$, speed $2r|\sin(t/2)|$ (note the absolute value sign!).
 - $8r$
 - no, since speed goes to zero at $t = 0$.