

Sixth Examination
Thursday, November 19, 2009

Instructions: This exam should be done on your own paper. Your name should be on each sheet and on the back of the last sheet; the answers should appear written carefully and in order. If in doubt, show intermediate steps: Full credit may not be given, even for correct answers, unless work is arranged clearly and explained. This exam is closed book. You may leave after handing in your exam paper, but be sure to check your answers carefully. Each part of each problem is worth 25 points. You may keep this question sheet.

1. Write down a parametrization for the line containing the points $(-1, 0, 1)$ and $(1, 4, 7)$.
2. Compute the length of the portion of the helix

$$\begin{aligned}x(t) &= \cos(t), \\y(t) &= \sin(t), \\z(t) &= t,\end{aligned}$$

for t between 0 and 2π .

3. An object's position at time t is given by

$$\vec{r}(t) = (\cos(\pi t), \sin(\pi t), t^2).$$

What is the object's speed at time $t = 1$, and in what direction is it pointing?

4. Write down parametric equations for the plane through $(1, 1, 1)$, $(2, 3, 4)$, and $(5, 6, 7)$.