

Name:

Grade: /8

Math 1321 Week 6 Lab Worksheet Due Thursday 10/02

1. **(2 points) Cylindrical & Spherical Coordinates:**

(a) Write the equation in cylindrical coordinates: $x^2 - y^2 + z^2 = 9$.

(b) Write the equation in spherical coordinates: $x^2z + y^2z = 2xy$.

2. **(3 points) Arc Length & Curvature:** The DNA molecule has the shape of a double helix. The radius of each helix is about 10 angstroms ($1\text{\AA} = 10^{-8}cm$). Each helix rises about 34\AA during each complete turn, and there are about 2.9×10^8 complete turns.

(a) Estimate the length of each helix.

(b) What is the definition of curvature?

(c) Estimate the curvature of each helix.

3. (a) **(1 point)** A particle has position function $\mathbf{r}(t)$. If $\mathbf{r}'(t) = \mathbf{c} \times \mathbf{r}(t)$, where \mathbf{c} is constant, describe that path of the particle.

(b) **(1 point)** If a particle moves in a straight line, what can you say about its acceleration vector?

(c) **(1 point)** If a particle moves with constant speed along a curve, what can you say about its acceleration vector?