

Name_____

Date_____

Vector Calculus Independent Study

Unit 1 Sample Test

1. An astronomer observes a comet at position $(7, -3, 5)$ in a coordinate system with the Earth at the origin (and distances measured in astronomical units, or *aus*).
 - (a) [5 points] If the Sun is at position $(-1, 0, 0)$, what is the distance between the Sun and the comet?
 - (b) [15 points] The Earth, the Sun, and the comet form a triangle. What is the area of this triangle? [10 points] What is the equation of the plane that it lies on?
 - (c) [10 points] There is a unique line going through the Sun and the Comet. What is the parametric description of this line? [20 points] What is the projection of the Earth onto this line? (Your answer should be a point in 3 space).
2. [10 points] Show that $(2, 1, 6)$, $(5, 7, 9)$, and $(8, 5, -6)$ are the vertices of a right triangle. [10 points] Find the area of this triangle.
3. [20 points] Convert the equation $x + z = y^2$ to both cylindrical and spherical coordinates.