

Exam #2

Math 321-A

Thursday, April 8, 2004

For full credit show all work. When in doubt, explain your reasoning.

1. Find equations for the tangent plane and normal line to the surface

$$\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 2$$

at the point $(1, 2, 2)$.

2. Convert the following equation to spherical coordinates, simplify, and describe the surface.

$$x^2 + y^2 = z^2$$

3. Find the normal and tangential components of acceleration for the following curve at the point $t = 1$.

$$\vec{c}(t) = (\ln(t), t, t^3)$$

4. Given the following curve, where $0 \leq t \leq 10$, find the arc-length $s(t)$ as a function of t .

$$\vec{c}(t) = (t \cos(t), t \sin(t))$$

5. For each of the following coordinate systems, explain when it would be easier to use that system of coordinates than Cartesian coordinates.

- (a) Cylindrical coordinates
- (b) Spherical coordinates