



AEW Worksheet 4
Ave Kludze (akk86)
MATH 1920

Name: _____

Collaborators: _____

1

Determine if the following statements are true(T) or false(F). Mark the correct answer. No justification needed.

- (a) ☐ T ☐ F If there is no solution t to the equation $u_0 + tu = v_0 + tv$ then the lines given by $\{u_0 + tu : t \in \mathbb{R}\}$ and $\{v_0 + tv : t \in \mathbb{R}\}$ do not intersect.
- (b) ☐ T ☐ F For any line in \mathbb{R}^3 and a point not on that line, there is exactly one plane that is normal to the line and contains the point.
- (c) ☐ T ☐ F If $|\mathbf{r}(t)| = 1$ for all t , then $|\mathbf{r}'(t)|$ is constant.

2

Sketch and describe the surface given below.

- (a) $\rho^2 - 3\rho + 2 = 0$

3

Explain in words the difference between colliding and intersecting for vector-valued functions.

- (b) Collide -
- (b) Intersect -

4 (Challenge)

Let E be the surface $x^2/9 + y^2/4 + z^2 = 1$, P be the plane $z = Ax + By$, and C be the intersection of E and P .

- (a) Is C an ellipse for all values of A and B ? Explain.
- (b) Sketch and interpret the situation in which $A = 0$ and $B \neq 0$
- (c) Find an equation of the projection of C on the xy -plane.
- (d) Assume $A = \frac{1}{6}$ and $B = \frac{1}{2}$. Find a parametric description of C as a curve in \mathbb{R}^3 (Hint: Assume C is described by $\langle a \cos t + b \sin t, c \cos t + d \sin t, e \cos t + f \sin t \rangle$ therefore find a, b, c, d, e , and f)

5 (Challenge)

Prove that the following equations below is true.

$$\frac{d}{dt}(\mathbf{u}(t) \times \mathbf{v}(t)) = \mathbf{u}'(t) \times \mathbf{v}(t) + \mathbf{u}(t) \times \mathbf{v}'(t)$$