

BIRZEIT UNIVERSITY
MATHEMATICS DEPARTMENT

Quiz 1

Math2311

Fall 2018/2019

Name..... BZU#..... Section#.....

Consider $r(t) = 2 \cos(t)i + 3 \sin(t)j + 2k$, which is the position vector function for a particle moving in space.

1. What is the particle's position at $t = \frac{\pi}{6}$

$$r\left(\frac{\pi}{6}\right) = \left\langle 2\frac{\sqrt{3}}{2}, 3\frac{1}{2}, 2 \right\rangle \text{ is position is } \left(\sqrt{3}, \frac{3}{2}, 2\right)$$

2. What is the particle's velocity at $t = \frac{\pi}{6}$

$$V(t) = -2\sin(t)i + 3\cos(t)j + 0k$$

$$V\left(\frac{\pi}{6}\right) = \left\langle -2\frac{1}{2}, 3\frac{\sqrt{3}}{2}, 0 \right\rangle = \left\langle -1, \frac{3\sqrt{3}}{2}, 0 \right\rangle$$

3. Find the equation of the tangent line to the particle's path at $t = \frac{\pi}{6}$

point $\left(\sqrt{3}, \frac{3}{2}, 2\right)$ direction $\left\langle -1, \frac{3\sqrt{3}}{2}, 0 \right\rangle$

$$x = \sqrt{3} - t$$

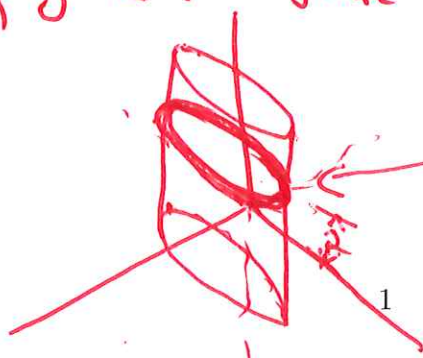
$$y = \frac{3}{2} + \frac{3\sqrt{3}}{2}t$$

$$z = 2 + 0t$$

4. Describe the particle's path or sketch it.

$$x^2 = 4\cos^2 t \quad y^2 = 9\sin^2 t$$

$$\Rightarrow \frac{1}{4}x^2 + \frac{1}{9}y^2 = 1 \text{ cylinder}$$



curve an ellipse parallel to the xy plane and above it by 2 units (on the $z=2$ plane)