## Math 233 - Quiz 6

October 2, 2025

Name key Score \_\_\_\_

Show all work to receive full credit. Supply explanations when necessary.

- 1. (3 points) What are the three main properties of the principal unit normal vector.
  - O N(t) IS A UDIT VECTOR
  - (ORTHOG. TO THE CHEVE (ORTHOG. TO T(t))
- (POINTS IN THE DIRECTION T(+) ISCHANGING (POINTS "INTO"
  THE CURVE)
- 2. (1 point) Refer to one of your properties from above to explain why  $\hat{N}(t)$  does not exist for a line.

LOOK AT 3 ...

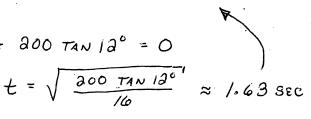
For motion Along A LINE, T(t) 13 NOT CHANGING.

3. (6 points) A projectile is fired from ground level at an angle of 12° with the horizontal. The projectile is to have a range of 200 feet. Find the required initial speed and the maximum height of the projectile. (Use  $q = 32 \, \text{ft/s}^2$ .)

$$V_0 \cos 10^\circ t = 200 \Rightarrow V_0 = \frac{200}{t \cos 10^\circ}$$

$$-16t^2 + V_0 \sin(100) t = 0$$

MAX HEIGHT ---



V<sub>0</sub> = 
$$\frac{900}{t \cos 10^{\circ}}$$
 ≈ 125. 44 FT/  
SEC