

Math 233 - Quiz 6

October 1, 2026

Name _____

Score _____

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

1. (2 points) What are the three important characteristics of the principal unit normal vector.

2. (4 points) Let $\vec{r}(t) = \cos 3t \hat{i} - \sin 3t \hat{j} - 4t \hat{k}$. Compute the principal unit normal vector $\hat{N}(t)$.

3. (4 points) Each of these equations defines a surface in 3-space. Briefly describe each surface.
 - (a) $10 + 3x^2 - 8y^2 + 5z^2 = 0$

 - (b) $4x^2 - \frac{1}{4}y^2 - \frac{1}{9}z^2 = -1$

 - (c) $z = (x + 1)^2 + 1$

 - (d) $4x^2 + 4y^2 - z = 1$