

QUIZ 3 - MATH 251

Friday, September 18

YOUR NAME: _____

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Read each problem **very carefully** before starting to solve it and do only what is asked. Each problem is worth around 5 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. [4 points]

(a) Consider the point represented in rectangular coordinates by $(1, -\sqrt{3}, 2)$. Write a representation in cylindrical coordinates.

(b) Consider the point represented in spherical coordinates by $(2, \frac{5\pi}{6}, \frac{\pi}{4})$. Write a representation in rectangular coordinates.

2. [4 points] Transform the spherical equation $\rho = 8 \sin \varphi \sin \theta$ into a rectangular equation. Then write it in a form appropriate to discover what it represents.

3. [6 points] Consider the vector-valued parametric equation $\mathbf{r}(t) = \langle \cos t, e^{-t}, t^2 - 8t + 7 \rangle$, where $t \geq 0$ represents “time”.

(a) Find the point in space at which the moving object starts its motion.

(b) At which times will the moving object be passing through the yz -coordinate plane?

(c) At which times will the moving object be passing through the xy -coordinate plane?

(d) Find the lowest point in the orbit of the moving object. At which time will the object be at that lowest point?