

QUIZ 4 - MATH 251

Friday, September 25

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. [3 points] Find an expression for the unit tangent vector of $\mathbf{r}(t) = \langle 2e^t, e^t \cos t, e^t \sin t \rangle$.

2. [3 points] Compute $\int_0^1 \left(e^{3t} \mathbf{i} + \sin 2t \mathbf{j} + \frac{6t}{t^2 + 1} \mathbf{k} \right) dt$.

3. [4 points] Find the curvature $\kappa(t)$ of $\mathbf{r}(t) = \langle 2 \sin 3t, t, 2 \cos 3t \rangle$.

4. [4 points] Find the length of the orbit of $\mathbf{r}(t) = \langle \sqrt{2} t, e^t, e^{-t} \rangle$, for $0 \leq t \leq 1$.
(**Hint:** At some point, you may want/need to use $2 = 2e^t e^{-t}$.)