

Quiz 2, Calculus III

Fall 2012

Name: _____

1. (4 points) Given the position function $\mathbf{r}(t) = \langle 2 \sin t, 2 \cos t, \sqrt{5}t \rangle$, find the unit tangent vector $\mathbf{T}(t)$. (Hint: if you have forgotten the formula for \mathbf{T} , it is simply the velocity vector normalized.)

2. (4 points) Use the acceleration function $\mathbf{a}(t) = e^t \mathbf{i} - 8\mathbf{k}$ and the initial conditions $\mathbf{v}(0) = 2\mathbf{i} + 3\mathbf{j} + \mathbf{k}$ and $\mathbf{r}(0) = \mathbf{0}$ to find the velocity and position functions.

3. (2 points) Below is a sketch of the position function $\mathbf{r}(t)$ from $t = 0$ to $t = 10$ in the plane. The dot in the middle of the curve represents the position at $t = 5$. Sketch in the velocity vector $\mathbf{v}(5)$ and the acceleration vector $\mathbf{a}(5)$ with their initial point located at the dot given for $\mathbf{r}(5)$.

