

Each problem is worth 5 points. Show all work for partial credit.

1. Find the derivative of the vector function $\mathbf{r}(t) = \langle \cos 3t, t, \sin 3t \rangle$.

If $\mathbf{r}(t) = \langle f(t), g(t), h(t) \rangle$

Then $\mathbf{r}'(t) = \langle f'(t), g'(t), h'(t) \rangle$

So, $\mathbf{r}'(t) = \langle -3\sin 3t, 1, 3\cos 3t \rangle$

Nice

2. Find the unit tangent vector to the vector function $\mathbf{r}(t) = 7t\mathbf{i} + t^2\mathbf{j} - (\ln t)\mathbf{k}$ at $t=2$.

$\mathbf{r}(t) = 7t\mathbf{i} + t^2\mathbf{j} - (\ln t)\mathbf{k}$

$\mathbf{r}'(t) = 7\mathbf{i} + 2t\mathbf{j} - \frac{1}{t}\mathbf{k}$

$\mathbf{r}'(2) = 7\mathbf{i} + 2(2)\mathbf{j} - \frac{1}{2}\mathbf{k}$

$\mathbf{r}'(2) = 7\mathbf{i} + 4\mathbf{j} - \frac{1}{2}\mathbf{k}$

Unit Vector = $\frac{\langle 7, 4, -\frac{1}{2} \rangle}{\sqrt{7^2 + 4^2 + \frac{1}{2}^2}} = \langle \frac{7}{\sqrt{65.25}}, \frac{4}{\sqrt{65.25}}, \frac{-\frac{1}{2}}{\sqrt{65.25}} \rangle$