Lecture 6 Worksheet

May 20, 2021

1. Find the domain of the vector valued function

$$\mathbf{r}(t) = \langle t^2 + 7, \frac{t-4}{t+4}, \ln(t+6) \rangle$$

2. Find the limit.

$$\lim_{t \to 0} \left\langle \frac{t}{\sqrt{t+4}-2}, 5, \frac{2e^t - 2}{t} \right\rangle$$

3. If $\mathbf{r}(t) = \langle \ln(3t), \sec(t), (t+7)^6 \rangle$, find the following:
   (a) $\mathbf{r}'(t)$
   (b) $\mathbf{r}''(t)$

4. Find the unit tangent vector at the point $(0, 1, 4)$ for the curve

$$\mathbf{r}(t) = \langle 2\ln(t), e^{1-t}, 4\sqrt{t} \rangle$$

5. Evaluate the integral.

$$\int_0^1 \left(\frac{8t}{t^2+1}\mathbf{i} + 2te^t\mathbf{j} + \frac{2}{t^2+1}\mathbf{k} \right) dt$$