Class 5, Practice Problems

Mutivariable Calculus

February 3, 2020

12.1 Vector Functions and Space Curves

1. Sketch the line segment represented by a vector equation,

$$\mathbf{r} = (1-t)\mathbf{i} + t\mathbf{j}, \;\; 0 \leq t \leq 1.$$

2. Write the vector equation for the line segment from $P = (0, 0, 4)$ to $Q = (2, 3, 0)$.

12.2 Calculus of Vector Functions

1. Sketch the position vector $\mathbf{r}(t)$ and the tangent vector $\mathbf{r}'(t)$ for $t = \dfrac{\pi}{4}$ where $\mathbf{r}(t) = \langle \cos(t), \sin(t) \rangle$.

2. Find the derivative of the vector function: $\mathbf{r}(t) = e^{t^2}\mathbf{i} - \mathbf{j} + \sin(3t)\mathbf{k}$.

3. Evaluate the integral: $\displaystyle\int (16t^3\mathbf{i} - \sin(3t)\mathbf{j} + e^{-2t}\mathbf{k})dt$.