

MA205 – LSN 18

Vector Functions and Space Curves

“A leader is a man who can adapt principles to circumstances.”



- General George S. Patton, JR.

Objectives

- **Understand what a space curve is and how it is related to parametric equations.**
- **Find the domain for a given vector function.**
- **Find indefinite and definite integrals of vector valued functions.**

Vectors, Functions and Vector Functions

$$\vec{v} = \langle 3, 4, 5 \rangle$$

$$f(t) = t^2 + 2$$

$$\vec{r}(t) = \langle 1 + t, 3 - 2t, 5 + 6t \rangle$$

Vector – indicates a quantity that has both *magnitude* and *direction*.

Function – a rule that assigns to each element in the *domain* an element in the *range*.

Vector Function – a function whose domain is a set of real numbers and whose range is a set of vectors.

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

$$\lim_{t \rightarrow a} \vec{r}(t) = \left\langle \lim_{t \rightarrow a} f(t), \lim_{t \rightarrow a} g(t), \lim_{t \rightarrow a} h(t) \right\rangle$$

provided the limits of the component functions exist.