10.2 – Derivatives and Integrals of Vector Functions

Derivatives

Example 1

a) Find the derivative of $\vec{r}(t) = \langle 1 - t^2, te^t, t\cos\ t \rangle$
b) Find the unit tangent vector when $t = 0$.

Definition of Smooth

Example 3
Determine whether the semicubical parabola $\vec{r}(t) = \langle t^3, t^2 \rangle$ is smooth.

Differentiation Rules

Example 4
Show that if $|\vec{r}(t)| = c$ (a constant), then $\vec{r}'(t)$ is orthogonal to $\vec{r}(t)$ for all *t*.

Definite Integrals

Indefinite Integrals

Example 5

If $\vec{r}(t) = t\,\vec{i} - \sin t\,\vec{j} + e^t\vec{k}$, then find $\int \vec{r}(t)dt$.

HW 10.2 # 3, 5, 7, 9, 13, 15, 19, 25, 27, 29, 31, 33