# Derivatives of Vector Functions (Section 3.7)

*EXAMPLE 1*

Sketch the following vector equations and include the direction of the curve. Find the equation of a unit tangent vector to the curve at the given value of *t*.

$$\boldsymbol{r}(t) = \langle t, t^2 \rangle, \quad t = 1$$

$$\boldsymbol{r}(t) = \langle 2\cos t, 3\sin t \rangle, \quad t = \pi/2$$



$$\boldsymbol{r}(t) = \langle t^2, 3t^3 \rangle, \quad t = 1$$

*EXAMPLE 2*

Find $\boldsymbol{r}'(t)$ and the domain of $\boldsymbol{r}(t)$ and $\boldsymbol{r}'(t)$ for

$$\boldsymbol{r}(t) = \langle t^2 - 4, \sqrt{9-t} \rangle$$

*EXAMPLE 3*

The position (in feet) of an object at time t (in seconds) is given by $\boldsymbol{r}(t) = \langle t, 25t - 5t^2 \rangle$

(a) Find the position, velocity, and speed at the time $t$=1

(b) When does the item strike the ground and with what speed?



*EXAMPLE 4*

Find the angle of intersection of the curves $\boldsymbol{r}(t) = \langle 1-t, 3+t^2 \rangle$ and $\boldsymbol{s}(u) = \langle u-2, u^2 \rangle$.