

$$10. \quad h = 20 \text{ ft} \quad v_0 = \frac{100 \text{ ft}}{\text{SEC}} \quad \theta = 45^\circ$$

$$\vec{r}(t) = (v_0 \cos \theta) t \vec{i} + \left[ h + (v_0 \sin \theta) t - \frac{1}{2} g t^2 \right] \vec{j}$$

$$\begin{aligned} \vec{r}(t) &= \left( \frac{100 \text{ ft}}{\text{SEC}} \cos 45^\circ \right) t \vec{i} + \left[ 20 \text{ ft} + \frac{100 \text{ ft}}{\text{SEC}} (\sin 45^\circ) t - \frac{1}{2} \left( \frac{32 \text{ ft}}{\text{SEC}^2} \right) (t^2) \right] \vec{j} \\ &= \left( \frac{100 \text{ ft}}{\text{SEC}} \cdot \frac{\sqrt{2}}{2} \right) t \vec{i} + \left[ 20 \text{ ft} + \frac{100 \text{ ft}}{\text{SEC}} \cdot \frac{\sqrt{2}}{2} t - \frac{16 \text{ ft}}{\text{SEC}^2} (t^2) \right] \vec{j} \end{aligned}$$