**MATH 311 – CALCULUS 3**
**Spring 2006**
**QUIZ 4**

**NAME**_____

1. An archer releases an arrow from ground level with a $30°$ angle of elevation and an initial speed of $100$ ft/sec. How far down range did the arrow travel until it hit the grounds?

2. Let $\mathbf{r}(t) = \langle 2\cos t, 3\sin t \rangle$. Find the velocity, speed and acceleration when $t = \frac{\pi}{2}$.

   $\mathbf{v}\left(\frac{\pi}{2}\right) =$

   $\left\|\mathbf{v}\left(\frac{\pi}{2}\right)\right\| =$

   $\mathbf{a}\left(\frac{\pi}{2}\right) =$

3. The velocity $\mathbf{v}(t) = \langle 2t, 3t^2 \rangle$. Find the position function $\mathbf{r}(t)$ given that $\mathbf{r}(0) = \langle 1, 2 \rangle$.

   $\mathbf{r}(t) =$

4. Let $\mathbf{r}(t) = \langle t, t^3 \rangle$. Find the unit tangent vector $\mathbf{T}(1)$.

   $\mathbf{T}(1) =$