Vector Functions and Curves
One variable functions

Question
Find the velocity, speed and acceleration of the particle with position given by $\underline{r}(t)$ at time t. Also determine the particles path.

$$\underline{r} = 3\cos t\underline{i} + 4\sin t\underline{j} + t\underline{k}$$

Answer
Position: $\underline{r} = 3\cos t\underline{i} + 4\sin t\underline{j} + t\underline{k}$
Velocity: $\underline{v} = -3\sin t\underline{i} + 4\cos t\underline{j} + \underline{k}$
Speed: $v = \sqrt{9\sin^2 t + 16\cos^2 t + 1} = \sqrt{10 + 7\cos^2 t}$
Acceleration: $\underline{a} = -3\cos t\underline{i} - 4\sin t\underline{j} = t\underline{k} - \underline{r}$
Path: a helix wound around the elliptical cylinder $(x^2/9) + (y^2/16) = 1$.