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.

$$\underline{r} = 3\cos t\underline{i} + 4\cos t\underline{j} + 5\sin t\underline{k}$$

Answer
Position: $\underline{r} = 3\cos t\underline{i} + 4\cos t\underline{j} + 5\sin t\underline{k}$
Velocity: $\underline{v} = -3\sin t\underline{i} - 4\sin t\underline{j} + 5\cos t\underline{k}$
Speed: $v = \sqrt{9\sin^2 t + 16\sin^2 t + 25\cos^2 t} = 5$
Acceleration: $\underline{a} = -3\cos t\underline{i} - 4\cos t\underline{j} - 5\sin t\underline{k} = -\underline{r}$
Path: the circle of intersection of the sphere $x^2 + y^2 + z^2 = 25$ and the plane $4x = 3y$.