COMPONENTS OF ACCELERATION

For each of the following curves, find formulas for the tangential and normal components of acceleration.

1. $\vec{r}(t) = 4\cos t\,\hat{i} + 4\sin t\,\hat{j}$

2. $\vec{r}(t) = (2+2t)\,\hat{i} + (1+3t)\,\hat{j}$

3. $\vec{r}(t) = 2t\,\hat{i} + t^2\,\hat{j} + \frac{t^3}{3}\hat{k}$

4. $\vec{r}(t) = e^t\,\hat{i} + e^{-t}\,\hat{j} + t\sqrt{2}\,\hat{k}$

5. $\vec{r}(t) = \cos t\,\hat{i} + \sin t\,\hat{j} + t\,\hat{k}$