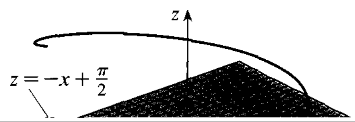
□ Figure 8 shows the helix and the osculating plane in Example 7.



SOLUTION The normal plane at P has normal vector $\mathbf{r}'(\pi/2) = \langle -1, 0, 1 \rangle$, so an equation is

$$-1(x - 0) + 0(y - 1) + 1\left(z - \frac{\pi}{2}\right) = 0 \qquad \text{or} \qquad z = x + \frac{\pi}{2}$$

10. Reparametrize the curve

$$\mathbf{r}(t) = \left(\frac{2}{\ldots} - 1\right)\mathbf{i} + \frac{2t}{\ldots}\mathbf{j}$$

(b) Estimate the curvature at P and at Q by sketching the osculating circles at those points.

curve and its curvature function $\kappa(x)$ on the same screen. Is the