

Answers ④

⑨ Parametric equations for the helix are

$$x = \sin t$$

$$y = \cos t$$

$$z = t$$

substituting into equation of sphere

$$\sin^2 t + \cos^2 t + t^2 = 10 \Rightarrow 1 + t^2 = 10 \Rightarrow t = \pm 3$$

$$\begin{aligned} r(3) &= (\sin(3), \cos(3), 3) \approx (0.141, -0.990, 3) \\ r(-3) &= (\sin(-3), \cos(-3), -3) \approx (-0.141, -0.990, -3) \end{aligned} \left. \vphantom{\begin{aligned} r(3) &= (\sin(3), \cos(3), 3) \\ r(-3) &= (\sin(-3), \cos(-3), -3) \end{aligned}} \right\} \text{points of intersection}$$

⑩  $\vec{PQ} = \langle 2, 3, 0 \rangle$

$$\vec{PR} = \langle 2, 0, 1 \rangle$$

$$\vec{PQ} \times \vec{PR} = \langle 3, -2, -6 \rangle$$