# Section 12.5: Lines and Curves in Space

## Warm up:

## Group work:

**Problem 1** *Find a vector-valued function for the line segment connecting the points* $P = (-3, 7, 6)$ *and* $Q = (5, -4, 7)$ *in such a way that the value at* $t = 0$ *is* $P$ *and the value at* $t = 1$ *is* $Q$*. Also, find the point two-thirds of the way from* $P$ *to* $Q$*.*

**Problem 2** *Find a vector-valued function for the line through the point* $(1, -2, 3)$ *that is perpendicular to the lines*

$$\vec{r}_1(t) = \langle 7, 8, -2 \rangle + t\langle 3, 5, 7 \rangle \quad \textit{and} \quad \vec{r}_2(s) = \langle 4, -3, -7 \rangle + s\langle 4, 9, -1 \rangle$$

**Problem 3** *Show that the curve* $\vec{r} = \langle t\cos t, t\sin t, t \rangle$ *lies completely on the cone* $z^2 = x^2 + y^2$*.*