

# 1.56(b)

## 1 1.56(b), §1 Asked

**Given:** The plane  $2x - 3y + 7z = 4$  and the point P with coordinates  $(x, y, z) = (1, -5, 7)$ .

**Asked:** The parametric equation for the line  $\ell$  through P and normal to the plane.

## 2 1.56(b), §2 Solution

Plane  $2x - 3y + 7z = 4$  and the point  $(1, -5, 7)$ .

In general, the equation for the line through  $P$  is

$$\vec{r} = \vec{r}_P + \lambda \vec{s}$$

where  $\vec{s}$  is any nonzero vector in the direction of the line.

The line is given to be normal to the plane, so the direction of the line is the direction of a normal vector to the plane, which can be picked out of the equation:

$$\vec{r} = (x, y, z) = (1, -5, 7) + \lambda(2, -3, 7) = (1 + 2\lambda, -5 - 3\lambda, 7 + 7\lambda)$$