

- 3 1. Find parametric equations for the line through the points $P(-1, 3, 5)$ and $Q(3, -2, 1)$.

$$\vec{v} = (3 - (-1))\hat{i} + (-2 - 3)\hat{j} + (1 - 5)\hat{k}$$

$$\vec{v} = 4\hat{i} - 5\hat{j} - 4\hat{k}$$

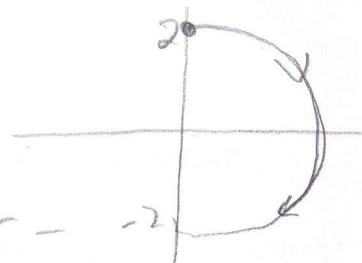
$$\boxed{\begin{aligned} x &= -1 + 4t \\ y &= 3 - 5t \\ z &= 5 - 4t \end{aligned}}$$

2. A) Give parametric equations for a semi-circle of radius 2, centered at the point $(0, 0)$, in quadrants I and IV, starting at the point $(0, 2)$ and ending at $((0, -2)$. Make sure you include the domain of t . Also note that the parameter t must increase, therefore t can not go from, say, 0 to -1 .

$$x = 2\sin(t) \quad 0 \leq t \leq \pi$$

$$y = 2\cos(t)$$

This is one answer - there are many.



- B) Give the position vector, $\vec{r}(t)$, for this motion.

$$\vec{r} = 2\sin(t)\hat{i} + 2\cos(t)\hat{j}$$

- 3 3. Set up the integral to find the volume bounded below by the cone $z = \sqrt{x^2 + y^2}$ and above by a sphere of radius 4. Use spherical coordinates.

$$\int_0^{2\pi} \int_0^{\pi/4} \int_0^4 \rho^2 \sin(\phi) d\rho d\phi d\theta$$

