Quiz #3 Solutions

Monday, Febuary 12 2018

Problem 1.

(1) In general, a parametric equation of the line through a point $A(x_0, y_0, z_0)$ and directed by a vector $\vec{u} = (u_1, u_2, u_3)$ is:

$$\begin{cases} x(t) & = x_0 + tu_1 \\ y(t) & = y_0 + tu_2 \\ z(t) & = z_0 + tu_3 \end{cases}$$
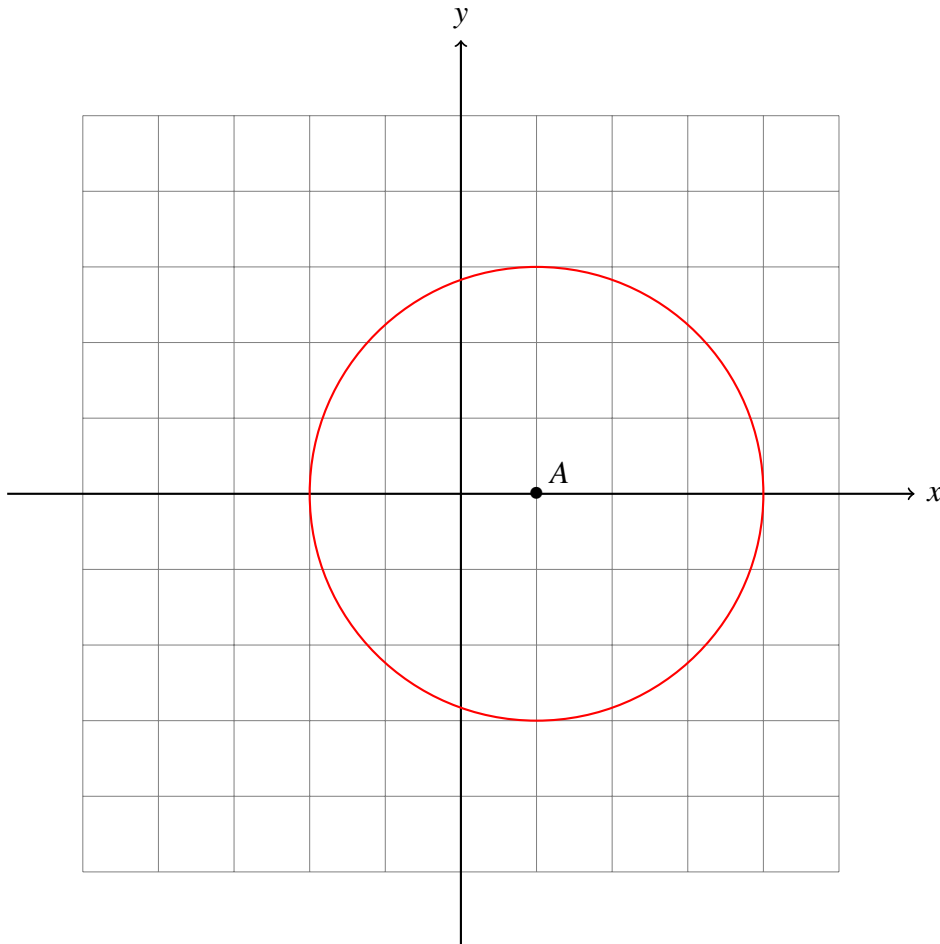
In this case, we get:

$$\begin{cases} x(t) & = 2t \\ y(t) & = -t \\ z(t) & = 1 \end{cases}$$

(2) Here we can take $A = P(1, 1, 0)$ and $\vec{u} = \overrightarrow{PQ} = (0, \ 0, 1)$, so we find:

$$\begin{cases} x(t) & = 1 \\ y(t) & = 1 \\ z(t) & = t \end{cases}$$

Problem 2.

This curve is the circle in the xy-plane with center $A(1, 0)$ and radius $R = 3$. Here is a sketch:

Problem 3.

(1) True [Take $t = 0$.]

(2) True [Take $t = -1$.]

(3) False [The first line is directed by $\vec{u} = (-2, 3, 1)$, the second line is directed by $\vec{v} = (2, -3, 1)$. These two vectors are not parallel.]

(4) False [It is a helix in 3D space.]