9-9.2-41

EE24BTECH11022 - Eshan Sharma

Question:
Area of the region in the first quadrant enclosed by the $x-axis$, the line $y=x$ and the circle $x^2+y^2=32$ is

Solution:

Symbol	Value	Description
C	$x^2+y^2=32$	Circle
L	$y=x$	Line
A	$\begin{pmatrix}4\\4\end{pmatrix}$	Intersection1
B	$\begin{pmatrix}4\sqrt{2}\\0\end{pmatrix}$	Intersection2
S	4π	Area enclosed

TABLE 0: Variables Used

The given circle **C** can be expressed as

$$v=\begin{pmatrix}1&0\\0&1\end{pmatrix}, u=0, f=-32 \tag{0.1}$$

The given line **L** is

$$h=\begin{pmatrix}1\\-1\end{pmatrix} \tag{0.2}$$

$$\mathbf{S}=\int_0^{x(\mathbf{A})} x\,dx+\int_{x(\mathbf{A})}^{x(\mathbf{B})}\sqrt{32-x^2}\,dx \tag{0.3}$$

$$=4\pi \text{ square units} \tag{0.4}$$

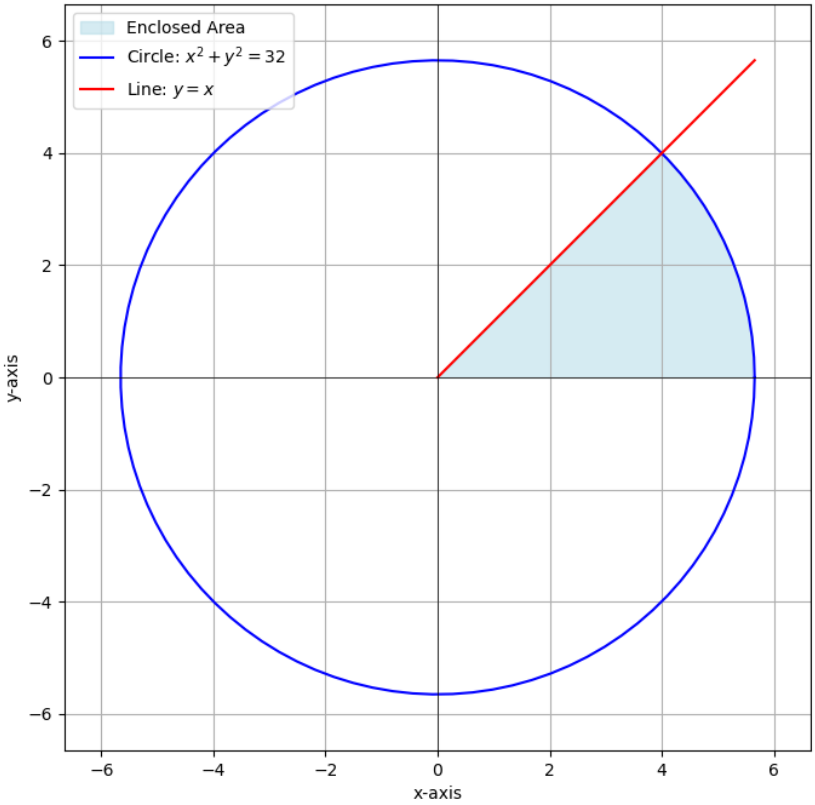

Fig. 0.1: Area enclosed in the first quadrant