For a point P in the plane, let $d_1(P)$ and $d_2(P)$ be the distance of the point P from the lines $x - y = 0$ and $x + y = 0$ respectively. The area of the region R consisting of all points P lying in the first quadrant of the plane and satisfying $2 \le d_1(P) + d_2(P) \le 4$, is

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(6) Let the point P be (x, y).

Then $d_1(P) = \left|\frac{x-y}{\sqrt{2}}\right|$ and $d_2(P) = \left|\frac{x+y}{\sqrt{2}}\right|$

For P lying in first quadrant $x > 0, y > 0$.

Now $2 \le d_1(P) + d_2(P) \le 4$

$$\Rightarrow 2 \le \left|\frac{x-y}{\sqrt{2}}\right| + \left|\frac{x+y}{\sqrt{2}}\right| \le 4$$

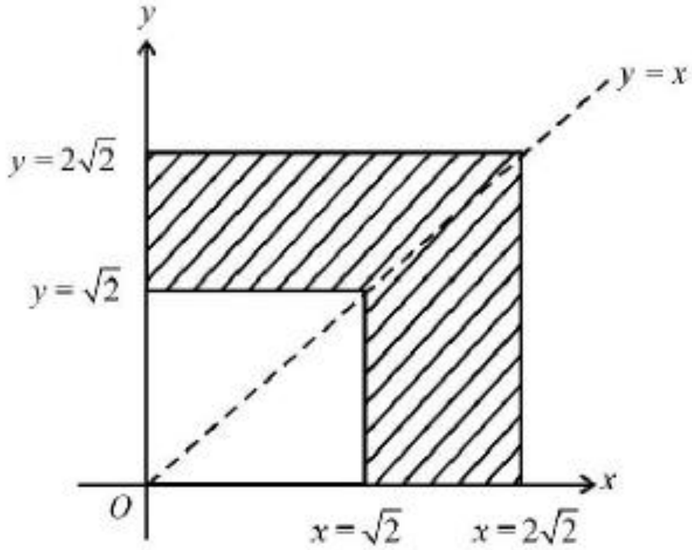
If $x > y$, then $2 \le \frac{x-y+x+y}{\sqrt{2}} \le 4$

$$\Rightarrow \sqrt{2} \le x \le 2\sqrt{2}$$

If $x < y$, then

$$2 \le \frac{y-x+x+y}{\sqrt{2}} \le 4 \quad \text{or} \quad \sqrt{2} \le y \le 2\sqrt{2}$$

The required region is the shaded region in the figure given below.



$\therefore$ Required area $= \left(2\sqrt{2}\right)^2 - \left(\sqrt{2}\right)^2 = 8 - 2 = 6$ sq units.