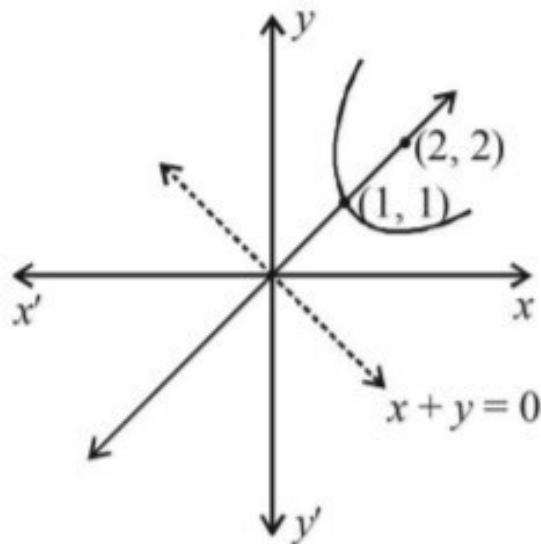


- 70 The axis of a parabola is along the line $y = x$ and the distances of its vertex and focus from origin are $\sqrt{2}$ and $2\sqrt{2}$ respectively. If vertex and focus both lie in the first quadrant, then the equation of the parabola is (2006 - 3M, -1)
- (a) $(x + y)^2 = (x - y - 2)$ (b) $(x - y)^2 = (x + y - 2)$
(c) $(x - y)^2 = 4(x + y - 2)$ (d) $(x - y)^2 = 8(x + y - 2)$

Solution: -

- 70(d) Since, distance of vertex from origin is $\sqrt{2}$ and focus is $2\sqrt{2}$
 \therefore Vertex is $(1, 1)$ and focus is $(2, 2)$, directrix $x + y = 0$



∴ Equation of parabola is

$$(x-2)^2 + (y-2)^2 = \left(\frac{x+y}{\sqrt{2}}\right)^2$$

$$\Rightarrow 2(x^2 - 4x + 4) + 2(y^2 - 4y + 4) = x^2 + y^2 + 2xy$$

$$\Rightarrow x^2 + y^2 - 2xy = 8(x + y - 2)$$

$$\Rightarrow (x-y)^2 = 8(x+y-2)$$