Question #72477

Solution:

The point P is (x, y, 0) because it is located on (x,y)-plane. Let's consider PA and PB as vectors.

Hence, $\overrightarrow{PA}$ is (1 – x, 2 – y, 3), $\overrightarrow{PB}$ is (7 – x, 6 – y, 5).

$\overrightarrow{PA}$ is orthogonal to $\overrightarrow{PB}$, so their dot product equals zero.

$(1 - x)(7 - x) + (2 - y)(6 - y) + 15 = 0$

$7 - x - 7x + x^2 + 12 - 2y - 6y + y^2 + 15 = 0$

$x^2 - 8x + 16 + y^2 - 8y + 16 + 2 = 0$

$(x - 4)^2 + (y - 4)^2 = -2$

Hence, there's no point that satisfies the condition, so the answer is (a) S is an empty set.

Answer: (a) S is an empty set.