Unit 1: Worksheet

1 Which points in the plane satisfy the equation $x^2 - 2x + y^2 = 3$?

2 Estimate the distance from the Harvard Stadium to the Bunker Hill Monument by measuring horizontal and vertical distances.

3 Can you describe the set $x^2 + (y - 1)^2 = 9$ in space?

4 What is the set $x^2 = y^2$ in space?

5 An Euler brick is a cuboid of dimensions $a,b,c$ such that $a^2 + b^2$ and $a^2 + c^2$ and $b^2 + c^2$ are all squares. Verify $(a,b,c) = (240, 117, 44)$ leads to an Euler brick. If also the space diagonal is an integer, an Euler brick is called a perfect cuboid. It is an open mathematical problem, whether a perfect cuboid exists. 

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1 Hints: 1) Complete the square to see that this is a circle in the plane. 2) About 18'000 feet. The x difference is about 17'500 feet and the y difference is about 4'000 feet. 3) This is a cylinder in space. 4) This is a union of two planes $x = y$ and $x = -y$. 