

Lecture 3

MATH 0200

Coordinate
plane

Graphs of
functions

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The coordinate plane and graphs

MATH 0200

Dr. Boris Tselikhovskiy

Outline

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Coordinate
plane

Graphs of
functions

1 Coordinate plane

2 Graphs of functions

Coordinate plane

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Definition

A **coordinate plane** is a coordinate system that uniquely specifies each point on the plane by a pair of numerical coordinates, which are the signed distances to the point from two fixed perpendicular oriented lines, measured in the same unit of length. Each reference coordinate line is called an **axis**, and the point where they meet is referred to as **origin**.

Coordinate plane

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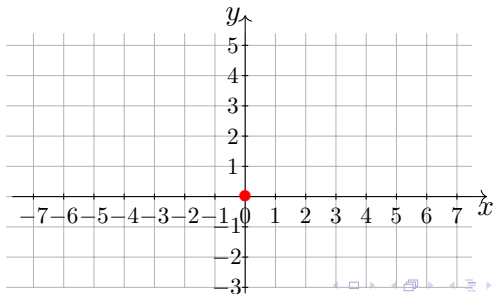
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Graphs

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Definition

The **graph** of a function f is the set of ordered pairs (x, y) , with $y = f(x)$. In case x and $f(x)$ are real numbers, these pairs form a subset of a coordinate plane.

Graphs

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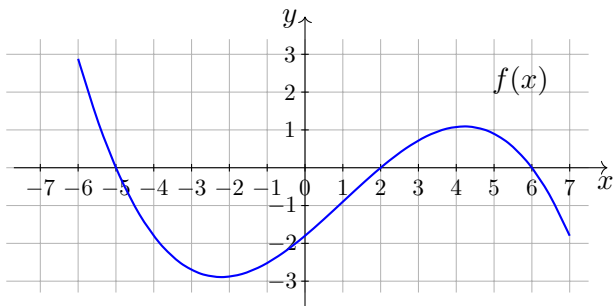
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Question

Is a number a in the range of a function $f(x)$?

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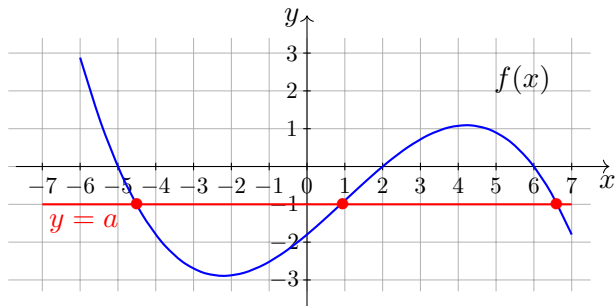
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A number a is in the range of a function $f(x)$ if and only if the horizontal line $y = a$ intersects the graph of $f(x)$.

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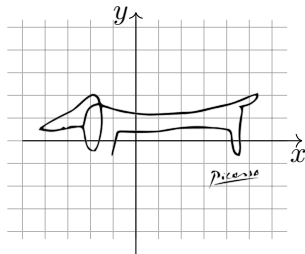
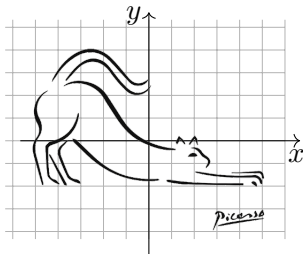
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Which 'pictures' (subsets of coordinate plane) are graphs of functions?

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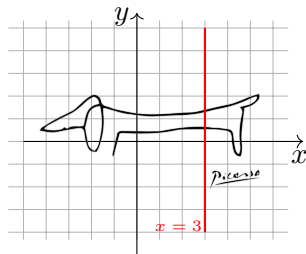
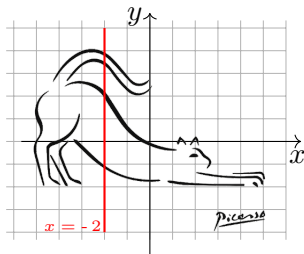
Which 'pictures' (subsets of coordinate plane) are graphs of functions?

Consider the following two paintings by a Spanish artist Pablo Picasso.

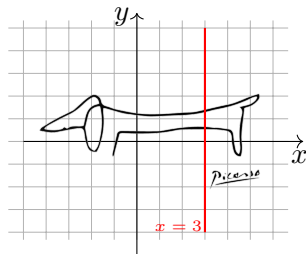
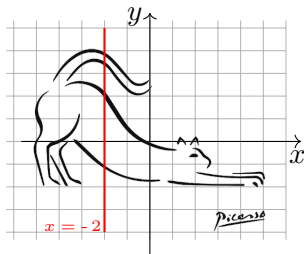


If there exists a vertical line $x = a$ that intersects the picture in more than one point, then the picture does not represent a graph of a function (as it assigns more than one value to $x = a$).

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The statement above is usually referred to as the **vertical line test**.