Squares of distances and 2-variable functions

Math 352 Calculus 3

September 9, 2013

Distances in the plane

- Find the distance between $(x_1, y_1), (x_2, y_2)$ in the plane:

$$d((x_1, y_1), (x_2, y_2)) = \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2}$$

Works because $(x_1, y_1), (x_2, y_2)$ are the endpoints of the hypotenuse of a right triangle.

Cleaning up the square root

- Often better to work with squares of distances

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- Because two positive numbers are equal if and only if their squares are equal.

Coordinate planes and axes

- Planes $x = 0$, $y = 0$, $z = 0$ are called the *coordinate* planes: the (y, z)-plane, (x, z)-plane, and (x, y)-plane, respectively

Intersection of the (x, z)-plane with the (y, z)-plane is a line whose points evidently all satisfy $y = x = 0$. This line is called the z-axis.

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- Intersect any pair of coordinate planes, we get a line.

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Workshop 00: Distances to planes and axes

2-variable functions

Contour plots