Math 111

October 3, 2022

Goals

- Related rates practice.
- Implicit differentiation practice.

Related rates

Steps for solving a related rates problem:

1. Draw a picture of the situation, labeling all relevant quantities.
2. Write equations relating the relevant variables and stating what we are given in terms of the variables.
3. Use the chain rule to differentiate the equation relating the variables.
4. Substitute into this equation all the quantities we know and solve for the quantity we are trying to determine.

Related rates problem

Imagine a long hallway with paintings along the wall on one side. A slowly rotating surveillance camera is mounted on the opposite wall. How fast should its angle be changing in order for it to be scanning the opposite wall at a constant rate? Express your solution just in terms of the angle (which is what we would need to program the camera).

Related rates problem

Imagine a long hallway with paintings along the wall on one side. A slowly rotating surveillance camera is mounted on the opposite wall. How fast should its angle be changing in order for it to be scanning the opposite wall at a constant rate? Express your solution just in terms of the angle (which is what we would need to program the camera).
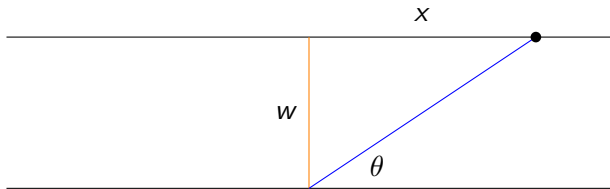
Implicit differentiation

The unit circle centered at the origin has defining equation

$$x^2 + y^2 = 1.$$
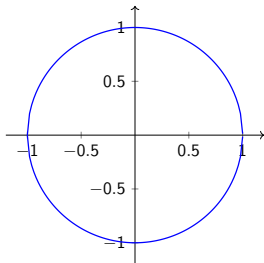
Use implicit differentiation to find the slope of the tangent to the circle at each point (x, y). What is the equation of the tangent line at $(\sqrt{3}/2, 1/2)$?

Implicit differentiation

Consider the points (x, y) satisfying

$$\cos(xy) = \frac{1}{2}.$$

Use implicit differentiation to find the equation for the tangent to the curve at each point $(\pi/3, 1)$.

Implicit differentiation

Consider the points (x, y) satisfying

$$\cos(xy) = \frac{1}{2}.$$

Use implicit differentiation to find the equation for the tangent to the curve at each point $(\pi/3, 1)$.