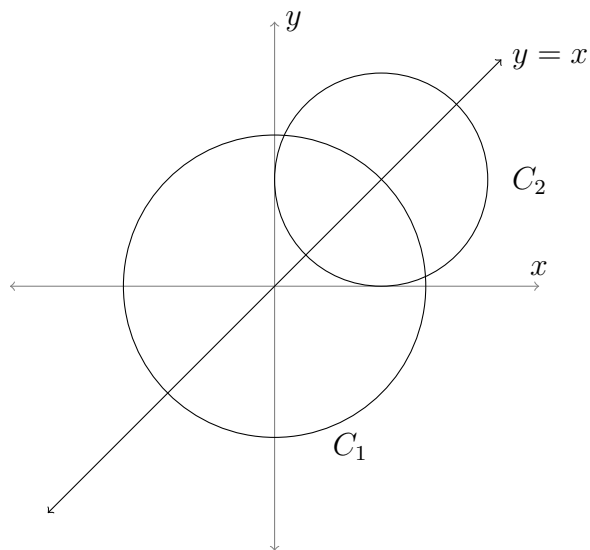


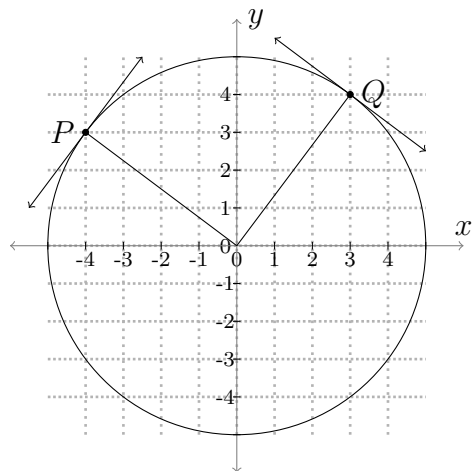
Worksheet for Week 1: Circles and lines

This worksheet is a review of circles and lines, and will give you some practice with algebra and with graphing. Also, this worksheet introduces the idea of “tangent lines” to circles. Later on in Math 124, you’ll learn how to find tangent lines to many other types of curves.

1. Two circles, called C_1 and C_2 , are graphed below. The center of C_1 is at the origin, and the center of C_2 is the point in the first quadrant where the line $y = x$ intersects C_1 . Suppose C_1 has radius 2. C_2 touches the x and y axes each in one point. What are the equations of the two circles?

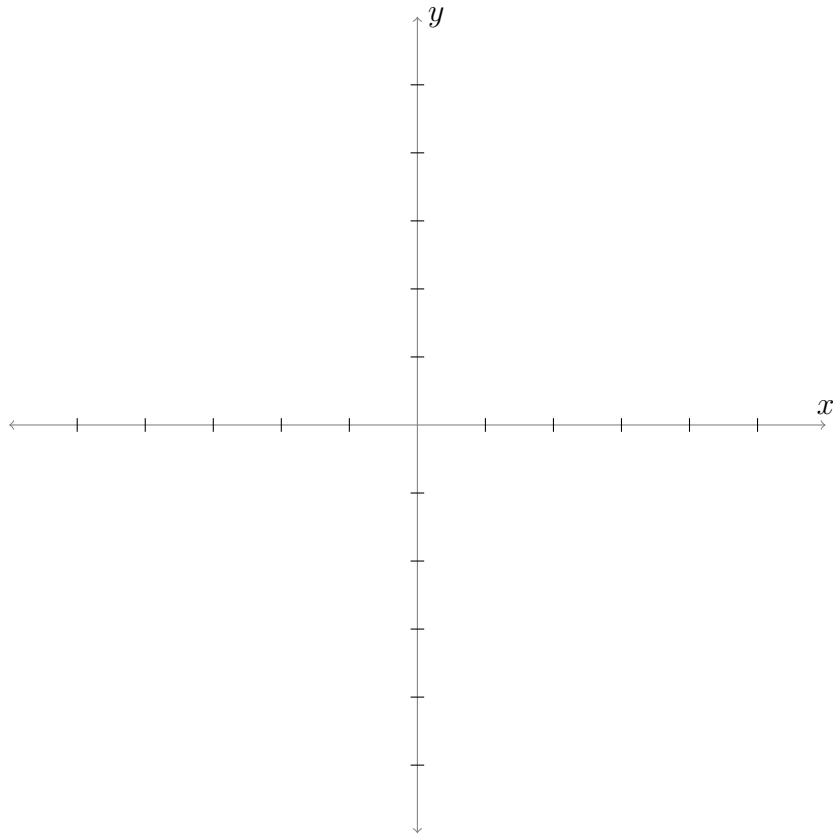


2. Let C be the circle of radius 5 centered at the origin. The **tangent line** to C at a point Q is the line through Q that's perpendicular to the radial line connecting Q to the center. (See picture.) Use this information to find the equations of the tangent lines at P and Q below.



Note: Later in Math 124, you'll learn how to find tangent lines to curves that are not circles!

3. Sketch the circle of radius 2 centered at $(3, -3)$ and the line L with equation $y = 2x + 2$. Find the coordinates of all the points on the circle where the tangent line is perpendicular to L .



4. Draw the circle with equation $x^2 + y^2 = 25$ and the points $P = (-3, -4)$ and $Q = (-8, 0)$. Explain why P is on the circle. Is the line through P and Q tangent to the circle? How do you know?