The circle in the graph below is centered at the origin and has radius 2. The line passes through the origin and has slope 2.

(a) Find an equation for the line.

(b) Find an equation for the circle.

(c) Find the exact coordinates of the point in the first quadrant where the line and the circle intersect. (Give an exact answer, not a decimal approximation.)
A tangent line to a circle at a given point is perpendicular to the ‘radial line’ that passes through the same point and the origin. Sketch a radial line on the graph below so that you can use this fact to find an equation for the indicated tangent line. Write your final answer in the form $y = mx + b$. (Note that the radius of this circle is 5 units.)
The graph below depicts a circle centered at the origin with radius 1, a point $P$ with coordinates $(2, 1)$, and a tangent line to the circle through $P$. Sketch another tangent line to the circle that also passes through the point $P$. Then find the coordinates of the point where that line touches the circle. (Hint: Start by assigning variables $(a, b)$ as the coordinates of the unkown point. Then find equations that must be satisfied by $a$ and $b$. Think slope!)
Find the equations of all the lines through the point \( Q(3, 6) \) that are tangent to the circle \( x^2 + y^2 = 4 \).