

Write the equation of the line TANGENT to the given circle at the given point.

1. $x^2 + y^2 = 17$, (1,4)
(0,0)
slope of r = $\frac{4-0}{1-0} = 4$
slope of tangent = $-1/4$

$$y - 4 = -1/4(x - 1)$$
$$y - 4 = -1/4x + 1/4$$
$$y = -1/4x + 17/4$$

2. $x^2 + y^2 = 20$, (-2,4)
(0,0)
slope of r = -2
slope of tangent = $1/2$

$$y - 4 = 1/2(x + 2)$$
$$y - 4 = 1/2x + 1$$
$$y = 1/2x + 5$$

3. $x^2 + y^2 = 10$, (1,3)
(0,0)
slope of r = $\frac{3}{1} = 3$
slope of tangent = $-1/3$

$$y - 3 = -1/3(x - 1)$$
$$y - 3 = -1/3x + 1/3$$
$$y = -1/3x + 10/3$$

4. $(x+1)^2 + y^2 = 50$, (-8,1)
(-1,0)
slope of r = $\frac{1-0}{-8+1} = \frac{1}{-7}$
slope of tan = 7

$$y - 1 = 7(x + 8)$$
$$y = 7x + 57$$

5. $(x+5)^2 + y^2 = 45$, (-2,6)
(-5,0)
slope of r = $\frac{6-0}{-2+5} = \frac{6}{3} = 2$
slope of tan = $-1/2$

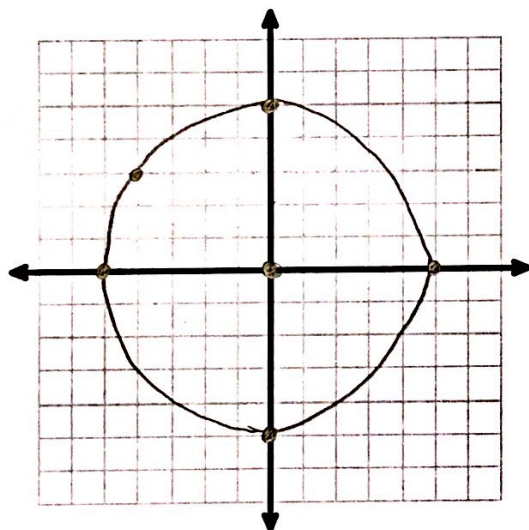
$$y - 6 = -1/2(x + 2)$$
$$y - 6 = -1/2x - 1$$
$$y = -1/2x + 5$$

6. $(x-1)^2 + (y-2)^2 = 290$, (-10,-12)
(1,2)
slope of r = $\frac{-12-2}{-10-1} = \frac{-14}{-11} = \frac{14}{11}$
slope of tan = $-11/14$

$$y + 12 = -11/14(x + 10)$$
$$y + 12 = -11/14x - \frac{110}{14}$$
$$y = -11/14x - \frac{110}{14} - \frac{168}{14}$$
$$y = -11/14x - \frac{278}{14}$$

7. Consider the circle $x^2 + y^2 = 13$. $(0, 0)$
- a) Write the equation of the line tangent to the circle through the point $(2, 3)$.
 slope of $r = 3/2$
 slope of $\tan = -2/3$
 $y - 3 = -2/3(x - 2)$
 $y - 3 = -2/3x + 4/3$
 $y = -2/3x + 13/3$
- b) Write the equation of the line tangent to the circle through the point $(-2, 3)$.
 slope of $r = -3/2$
 slope of $\tan = 2/3$
 $y - 3 = 2/3(x + 2)$
 $y - 3 = 2/3x + 4/3$
 $y = 2/3x + 13/3$
- c) How are the two tangent lines related (slope and y-intercept)?
 Neg slopes, same int.

8. Graph the circle $x^2 + y^2 = 25$. Then, graph the line tangent to the circle through the point $(-4, 3)$. What is the equation of this line? slope of $r = \frac{3-0}{-4-0} = -\frac{3}{4}$



slope of $\tan = 4/3$

$$y - 3 = 4/3(x + 4)$$

$$y - 3 = 4/3x + 16/3$$

$$y = 4/3x + 25/3$$

Write the equation of the circle in standard form given the center and a point P on the circle.

9. $C = (3, -7)$ $P = (4, 0)$ $r = \sqrt{(4-3)^2 + (0+7)^2} = \sqrt{1+49} = \sqrt{50} = 5\sqrt{2}$

$$(x - 3)^2 + (y + 7)^2 = 50$$

10. $C = (0, 3)$ $P = (2, 5)$ $r = \sqrt{(2-0)^2 + (5-3)^2} = \sqrt{4+4} = \sqrt{8} = 2\sqrt{2}$

$$x^2 + (y - 3)^2 = 8$$