

1. For each circle, find its (i) center, (ii) radius, and (iii) equation for the (left/right/top/bottom) specified semicircle.

(a) $x^2 - 12x + y^2 - 4y = -15$

(b) $x^2 + y^2 + 6x + 6y = 31$

(c) $4x + y^2 + x^2 = 45$