77. Completing the square gives $x^2+y^2-4y-12=0 \quad \Leftrightarrow \quad x^2+y^2-4y+\_\_=12 \quad \Leftrightarrow$ $x^2+y^2-4y+\left(\frac{-4}{2}\right)^2=12+\left(\frac{-4}{2}\right)^2 \quad \Leftrightarrow \quad x^2+(y-2)^2=16$. Thus, the center is $(0,2)$, and the radius is 4. So the circle $x^2+y^2=4$, with center $(0,0)$ and radius 2, sits completely inside the larger circle. Thus, the area is $\pi 4^2-\pi 2^2=16\pi-4\pi=12\pi$.

79. Completing the square gives $x^2+y^2+ax+by+c=0 \quad \Leftrightarrow$

$$x^2+ax+\_\_+y^2+by+\_\_=-c \quad \Leftrightarrow$$

$$x^2+ax+\left(\frac{a}{2}\right)^2+y^2+by+\left(\frac{b}{2}\right)^2=-c+\left(\frac{a}{2}\right)^2+\left(\frac{b}{2}\right)^2 \quad \Leftrightarrow$$

$$\left(x+\frac{a}{2}\right)^2+\left(y+\frac{b}{2}\right)^2=-c+\frac{a^2+b^2}{4}.$$

This equation represents a circle only when $-c+\frac{a^2+b^2}{4}>0$. This equation represents a point when $-c+\frac{a^2+b^2}{4}=0$, and this equation represents the empty set when $-c+\frac{a^2+b^2}{4}<0$. When the equation represents a circle, the center is $\left(-\frac{a}{2},-\frac{b}{2}\right)$, and the radius is

$$\sqrt{-c+\frac{a^2+b^2}{4}}=\frac{1}{2}\sqrt{a^2+b^2-4ac}.$$