

MATH 201: ELLIPSES

The equation of a circle of centre 0 and radius $r > 0$ is

$$x^2 + y^2 = r^2;$$

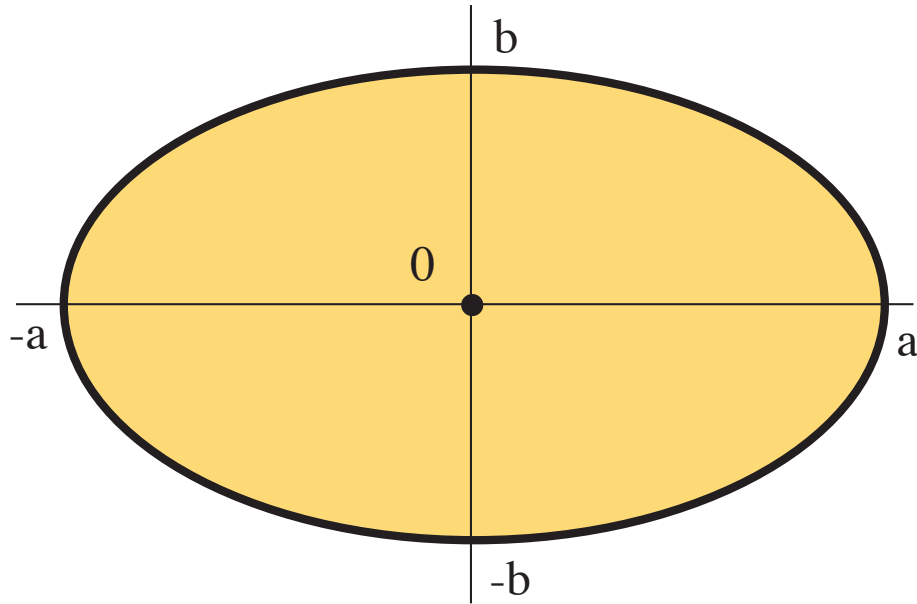
that is

$$\frac{x^2}{r^2} + \frac{y^2}{r^2} = 1. \quad (1)$$

For $a, b > 0$ consider the equation

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1. \quad (2)$$

This is the equation of curve known as an *ellipse*. The numbers a, b are called the *semi-axes* of the ellipse. If $a = b = r$, equation (2) becomes the equation (1) of a circle. The picture illustrates an ellipse with semi-axes a, b respectively and where $a > b$.



Note that in (2), if we put $y = 0$, we get $x^2 = a^2$ – that is, $x = a$ or $x = -a$. That is $(-a, 0)$ and $(a, 0)$ are “extreme” points on the ellipse in the horizontal direction. Similarly if we put $x = 0$ in (2), we see that $(0, -b)$ and $(0, b)$ are “extreme” points on the ellipse in the vertical direction.

That is all you need to know about ellipses at this stage.

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