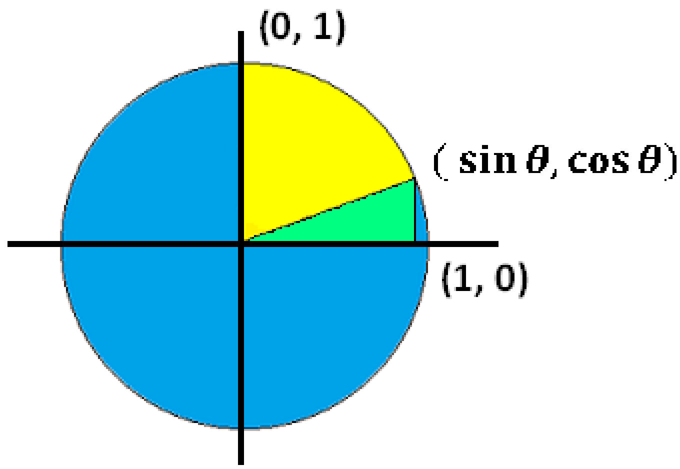
Computing the area of a circular sector

In the drawing below, the region colored in yellow is a circular sector whose angular size is θ, where θ is acute (between 0 and $\frac{1}{2}\pi$, measured in radians). The combined area of the regions colored in yellow and green is equal to

$$\int_0^{\sin\theta} \sqrt{1-x^2}\ dx$$

and the area of the triangular region colored in green is easy to compute; if we take the difference of these areas, we obtain the area of the circular sector colored in yellow. The definite integral and its indefinite counterpart can be found using a table of antiderivatives (indefinite integrals) or the standard integration techniques from single variable calculus.



We can use the same picture to find the area of a sector if the angle's measure is greater than $\pi/2$ radians by noting that in general θ can be written as $k\pi/2 + \alpha$, where k is an integer between 0 and 3, and α is between 0 and $\pi/2$. If k is positive, then such a sector is given by taking the union of the region shaded in yellow with k of the adjacent blue quarter circles going counterclockwise from the left hand edge of the yellow region.