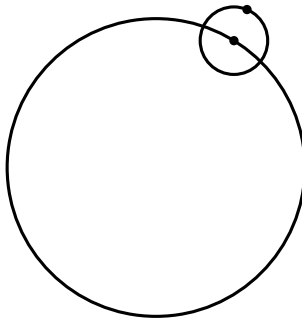


18.022 Recitation Quiz (with solutions)
8 September 2014

1. A circus ride consists of a chair revolving at 30 revolutions per minute around a point which is itself revolving around different point at a rate of 12 revolutions per minute, as shown in the figure. The radii of the two circles are 2 meters and 8 meters, respectively. Assuming that the chair starts 10 meters directly to the right of center of the larger circle, write a parametric expression in terms of t (measured in minutes) which describes the position of the chair relative to the center of the larger circle.



Solution. The point on the larger circle is at the location $(\cos(2\pi t/30), \sin(2\pi t/30))$, while the vector from this point to the chair is $(\cos(2\pi t/12), \sin(2\pi t/12))$. The location of the chair is the vector sum of these vectors, which is

$$(\cos(2\pi t/30) + \cos(2\pi t/12), \sin(2\pi t/30) + \sin(2\pi t/12)).$$