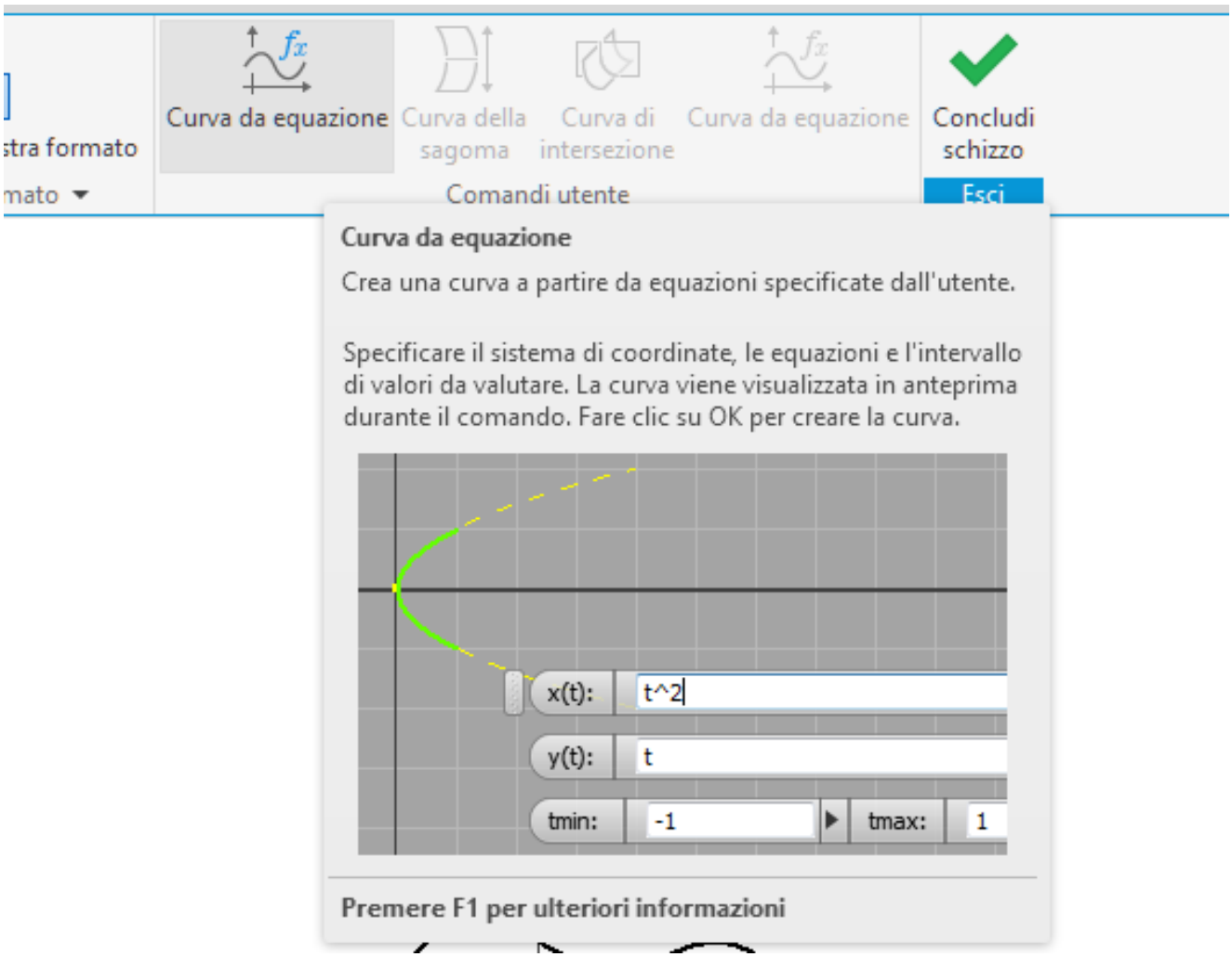
# Cycloidal profile 3D model with Inventor

The disk profile comes from a Cycloid, which is a curve traced by a point on a circle as it rolls along a straight line without slipping, or its variation, an Epicycloid which is traced when rolling on a circumference of a circle.

For drawing such a curve, we can use these parametric equations here but there are also other parameters to include in them, such as the roller's diameter and the eccentricity.

In an active sketch, click Sketch tab ➤ Create panel ➤ Equation Curve (2D sketch Line) or 3D Sketch tab ➤ Draw panel ➤ Equation Curve (3D sketch Line).

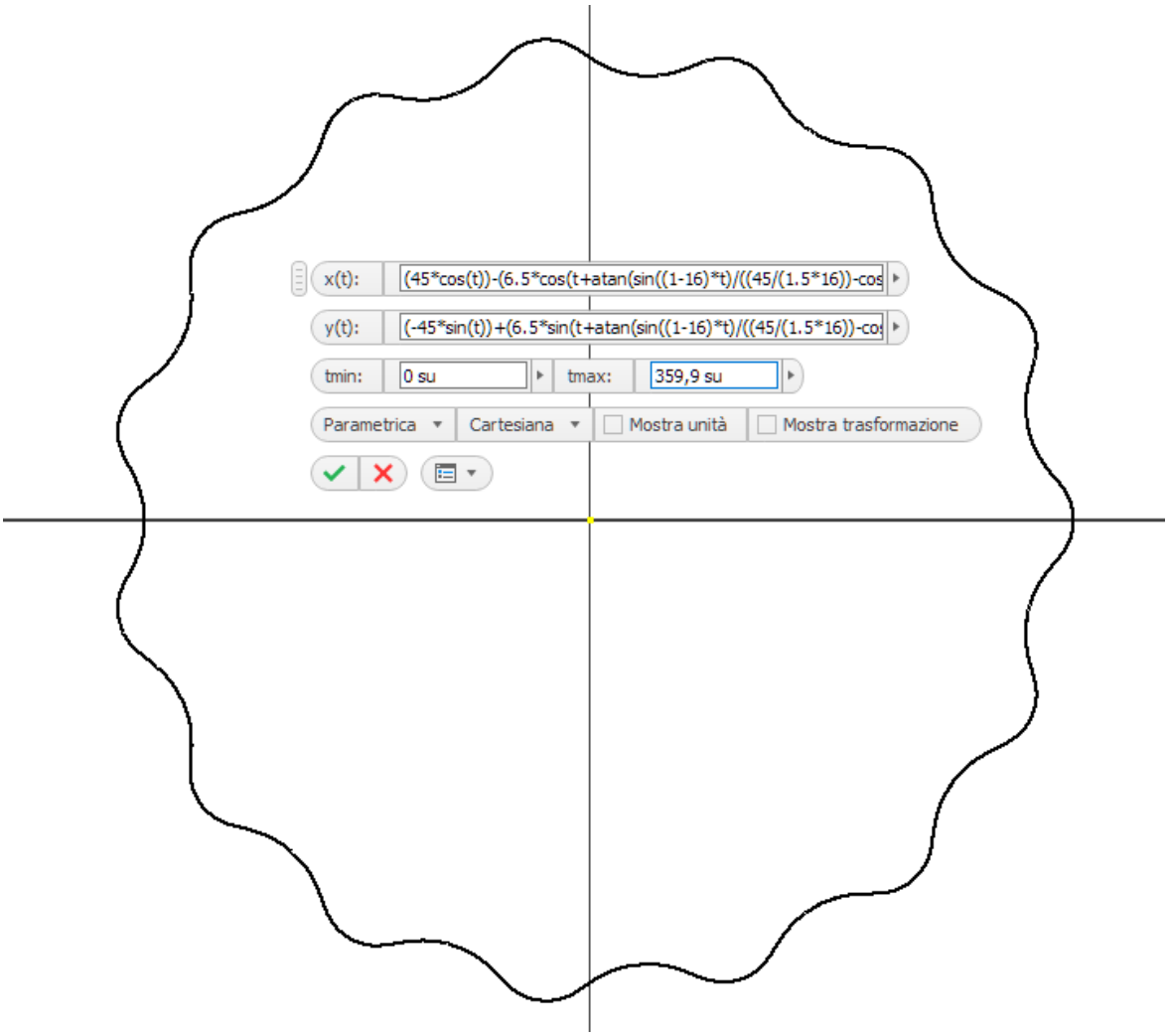
If the tool is not visible you can add it from the "customize user commands".



Insert the two equations appropriately and that will generate the cycloidal disk profile:

x(t)= (45*cos(t))-(6.5*cos(t+atan(sin((1-16)*t)/((45/(1.5*16))-cos((1-16)*t)))))-(1.5*cos(16*t))

y(t)= (-45*sin(t))+(6.5*sin(t+atan(sin((1-16)*t)/((45/(1.5*16))-cos((1-16)*t)))))+(1.5*sin(16*t))

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N - Number of rollers
Rr - Radius of the roller
R - Radius of the rollers PCD (Pitch Circle Diamater)
E - Eccentricity - offset from input shaft to a cycloidal disk

x = (R*cos(t))-(Rr*cos(t+arctan(sin((1-N)*t)/((R/(E*N))-cos((1-N)*t)))))-(E*cos(N*t))
y = (-R*sin(t))+(Rr*sin(t+arctan(sin((1-N)*t)/((R/(E*N))-cos((1-N)*t)))))+(E*sin(N*t))

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Values for this DIY Cycloidal Drive:

N = 16
Rr = 6.5
R = 45
E = 1.5

x = (45*cos(t))-(6.5*cos(t+arctan(sin((1-16)*t)/((45/(1.5*16))-cos((1-16)*t)))))-
(1.5*cos(16*t))
y = (-45*sin(t))+(6.5*sin(t+arctan(sin((1-16)*t)/((45/(1.5*16))-cos((1-
16)*t)))))+(1.5*sin(16*t))
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Also note that the curve won’t be generated if the “t” parameters are from 0 to 2*pi or 360 degrees. You need to set the t2 parameter a little bit short of 2*pi, and then generate the curve with a small gap which we can connect it using a simple spline.