regular $n$-gons
as
Funny Circles
I am working on an n-gon

How long is $OT$?

We use law of sines in $\triangle OAT$:

$$\frac{\sin \angle AT}{1} = \frac{\sin \angle A}{OT}$$

$\triangle OAB$ is "isocasal".

$OA = OB = 1$

$\theta = \frac{\pi - \frac{2\pi}{n}}{2}$

$\triangle OAB$ is "isocasal".

$OA = OB = 1$
\[
\overline{OT} = \frac{\sin \times A}{\sin \times T} = \frac{\sin \left(\frac{\pi - 2\pi n}{2}\right)}{\sin \left(\pi - \theta - \frac{\pi - 2\pi n}{2}\right)}
\]

\[
f(\theta) = \overline{OT} \cdot \cos(\theta)
\]

\[
g(\theta) = \overline{OT} \cdot \sin(\theta)
\]

See below, for hopefully clearer presentation:
A, B are vertices of the n-gon in the unit circle. So, the angle $\angle{BOA} = \frac{2\pi}{n}$. We want to find the length OT as it depends on the angle $\theta$. $\angle{TOA} = \theta$.

Use the Law of Sines in $\triangle OAT$:

$\triangle OAT = \frac{1}{2}(\pi - \frac{2\pi}{n})$ since $\triangle AOB$ is isosceles. $OA = OB = 1$

$\angle OTA = \pi - \theta - \frac{1}{2}(\pi - \frac{2\pi}{n})$

Thus

$$\frac{\sin \angle OTA}{1} = \frac{\sin \angle OAT}{OT}$$

$$\frac{OT}{\sin \angle OAT} = \frac{\sin \angle OTA}{1}$$
\[
sin \theta = \sin \left( \frac{\pi}{2} - \frac{\pi}{n} \right) = \cos \left( \frac{\pi}{n} \right)
\]
\[
\sin \theta = \sin \left( \pi - \theta - \frac{\pi}{2} + \frac{\pi}{n} \right) = \sin \left( \frac{\pi}{2} + \frac{\pi}{n} - \theta \right) = \cos \left( \frac{\pi}{n} - \theta \right)
\]
Therefore the coordinates of the point \( T \) are
\[
\frac{\cos \left( \frac{\pi}{n} \right)}{\cos \left( \frac{\pi}{n} - \theta \right)} \left( \cos(\theta), \sin(\theta) \right).
\]

Therefore
\[
\begin{align*}
    f(\theta) &= \frac{\cos \left( \frac{\pi}{n} \right)}{\cos \left( \frac{\pi}{n} - \theta \right)} \cos(\theta) \\
    g(\theta) &= \frac{\cos \left( \frac{\pi}{n} \right)}{\cos \left( \frac{\pi}{n} - \theta \right)} \sin(\theta)
\end{align*}
\]
This is a funny cosine.
This is a funny sine.

See the implementation in 20210216-A1Pl. nb