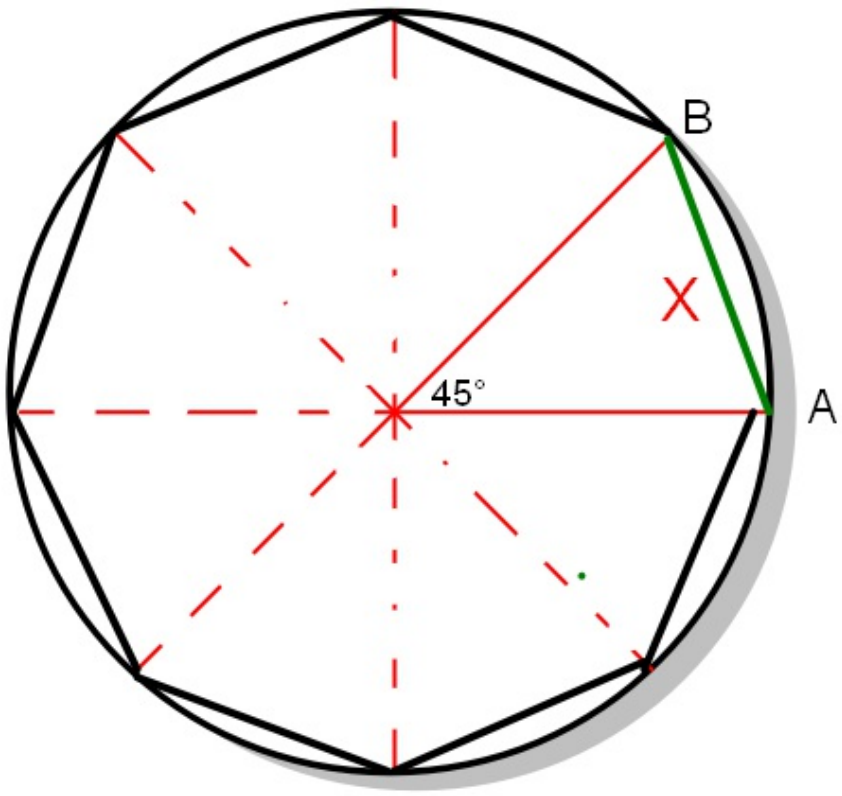
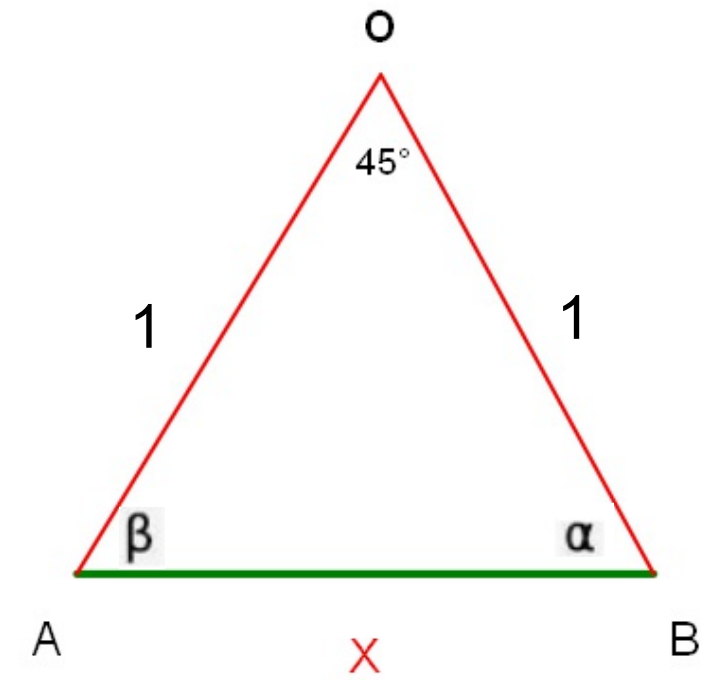
estimate_Pi(n)

MOTIVATION:



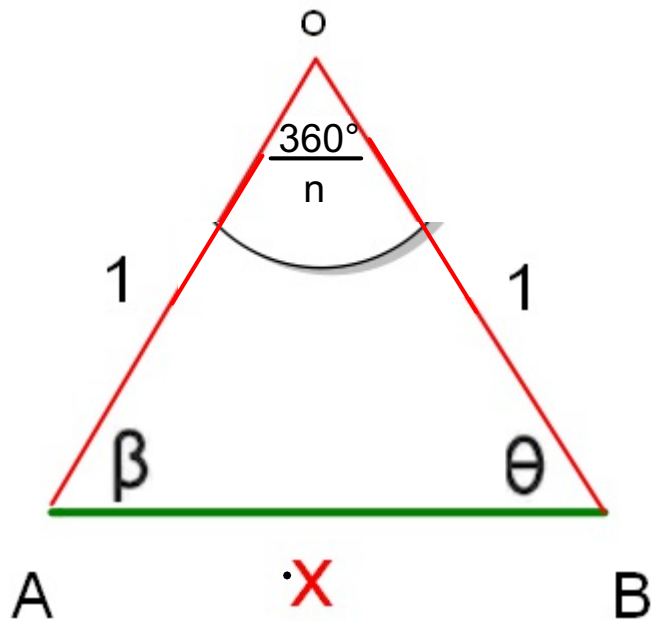
n = 8
r = 1



Using the Law of Sines:

$$\frac{\sin(45°)}{X} = \frac{\sin(\beta)}{1}$$

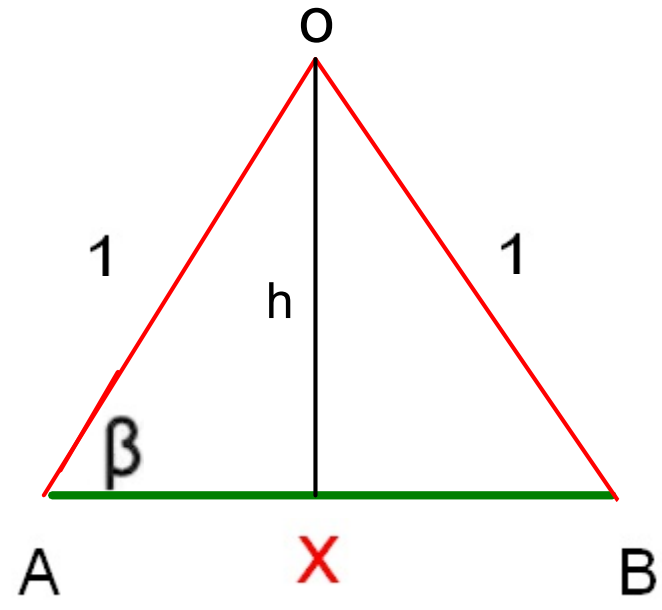
$$X = \frac{\sin(45°)}{\sin(\beta)}$$



Using the Law of Sines:

$$\frac{\text{Sin}(360°/n)}{X} = \text{Sin}\,\beta$$

$$X = \frac{\text{Sin}(360°/n)}{\text{Sin}\,\beta}$$



$$\text{Sin}\,\beta = h$$

$$\text{Area } \triangle \text{ AOB} = \frac{X \cdot \text{Sin}\,\beta}{2}$$

$$\text{Area } \triangle \text{ AOB} = \frac{\frac{\text{Sin}(360°/n)}{\text{Sin}\,\beta} \cdot \text{Sin}\,\beta}{2}$$

$$\text{Area } \triangle \text{ AOB} = \frac{\text{Sin}(360°/n)}{2}$$

$$A_p = \text{Area of Regular Polygon} = n \cdot \frac{\text{Sin}(360°/n)}{2}$$

$\downarrow$

$A_p \longrightarrow \pi$

If

$n \longrightarrow \infty$

$\longrightarrow$

$$\lim_{n \to \infty} \left[n \cdot \frac{\text{Sin}(360°/n)}{2} \right] = \pi$$