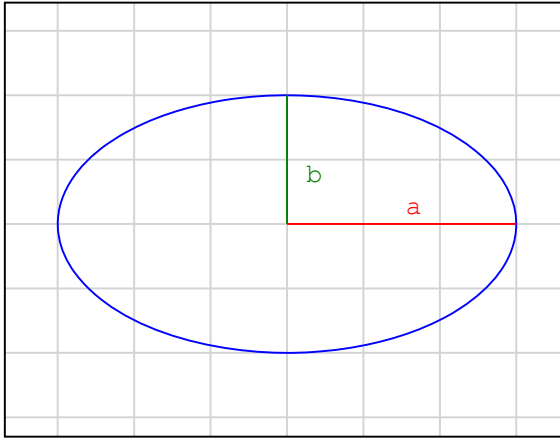


PERIMETER OF AN ELLIPSE

Example of an Ellipse



Major Radius $a := 3$

Minor Radius $b := 2$

Unnamed Quantity $h := \frac{(a-b)^2}{(a+b)^2}$

Ellipse Eccentricity $e_c := \frac{\sqrt{a^2 - b^2}}{a}$

Perfect Formula for Perimeter of an Ellipse

$$P_e := 4 \cdot a \cdot \int_0^{\frac{\pi}{2}} \sqrt{1 - e_c^2 \cdot (\sin(\theta))^2} d\theta = 15.8654395892906$$

Method 1: Kepler Approximation

$$P := 2 \cdot \pi \cdot \sqrt{a \cdot b} = 15.3905979619424$$

Method 2: Naive Approximation

$$P := \pi \cdot (a + b) = 15.707963267949$$

Method 3: Euler Approximation

$$P := \pi \cdot \sqrt{2 \cdot (a^2 + b^2)} = 16.0190422444141$$

Method 4: Peano Approximation

$$P := \pi \cdot (a + b) \cdot \left(\frac{3 - \sqrt{1-h}}{2} \right) = 15.8666459209523$$

Method 5: Lazy Approximation

$$P := \pi \cdot \left(\frac{6 \cdot a}{5} + \frac{3 \cdot b}{4} \right) = 16.0221225333079$$

Method 6: Lindner Approximation

$$P := \pi \cdot (a + b) \cdot \left(1 + \frac{h}{8} \right)^2 = 15.8654355997101$$

Method 7: Hudson Approximation

$$P := \pi \cdot \frac{(a+b)}{4} \cdot \left(3 \cdot \left(1 + \frac{h}{4} \right) + \frac{1}{1 - \frac{h}{4}} \right) = 15.8654395663676$$

Method 8: Infinite Series

$$P := 2 \cdot a \cdot \pi \cdot \left(1 - \sum_{j=1}^{50} \left(\frac{((2 \cdot j)!)^2}{(2^j \cdot (j!))^2} \right)^2 \cdot \frac{e_c^{2 \cdot j}}{2 \cdot j - 1} \right) = 15.8654395892905$$

Method 9: Zafary Approximation

$$P := \pi \cdot (a + b) \cdot \left(\frac{4}{\pi} \right)^h = 15.8604783620635$$

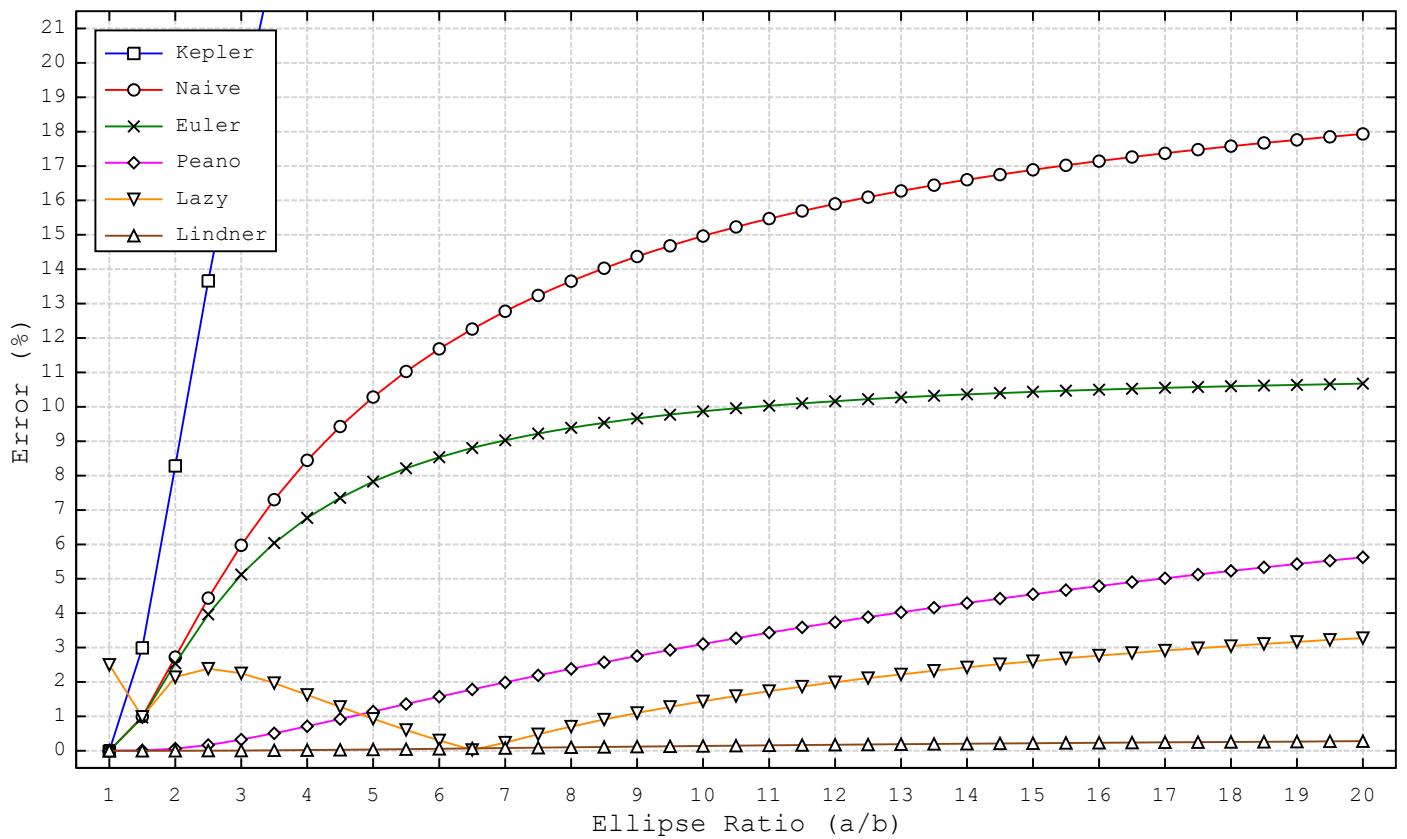
Method 10: Ramanujan I Approximation

$$P := \pi \cdot \left(3 \cdot (a + b) - \sqrt{(3 \cdot a + b) \cdot (a + 3 \cdot b)} \right) = 15.865437575564$$

Method 11: Ramanujan II Approximation

$$P := \pi \cdot (a + b) \cdot \left(1 + \frac{3 \cdot h}{10 + \sqrt{4 - 3 \cdot h}} \right) = 15.8654395892512$$

Ellipse Perimeter Calculation Error Table (Method 1-6)



Ellipse Perimeter Calculation Error Table (Method 6-11)

