π APPROXIMATION

Length of a curve

Here's the relationship giving the length of a curve in an orthonormal frame of reference of a function $f : \mathbb{R} \to \mathbb{R}, x \mapsto f(x)$.

$$\lambda(a,b) = \lim_{h \to 0} \sum_{\substack{i=a \\ i=i+h}}^{b} \sqrt{(f(i+h) - f(h))^2 + h^2}$$

You can see for yourself by drawing a reference frame with a given function and using the Pythagorean Theorem.

Using the function $f(x) = \sqrt{1 - x^2}$ in the interval $I = [-1; 1]$, we find π.