\[ A = 1000 \text{ cm}^2 \]

\[ A = \pi r^2 \]

\[ \frac{1000}{\pi} = r \]

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**Example:**

\[ \lim_{x \to -1} f(x) = L \]

Recall:

\[ \lim_{x \to a} f(x) = L \]

\[ f(a) = 2x - 2 \]

\[ L = -4 \]

\[ a = -1 \]

\[ \forall \varepsilon > 0 \exists \delta > 0 \text{ s.t.} \]

\[ 0 < |x - a| < \delta \implies |f(x) - L| < \varepsilon \]

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**Problem:**

\[ f(x) = \pi x^2 \]

\[ \lim_{x \to \frac{1000}{\pi}} x = 1000 \]

\[ a = \frac{1000}{\pi} \]

Looking at an \[ \varepsilon \text{ of } 5 \text{ cm} \]

We are asking what \( S \) we need

so that \[ 0 < |x - \frac{1000}{\pi}| < \delta \]

means that \[ |f(x) - 1000| < 5 \]

From graph, we found \( S \) needs to be

less than \( .0445 \)

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We want \( S \) such that

\[ \left| f(\omega) - L \right| < \varepsilon \]

\[ \left| 2\omega - 4 \right| < \varepsilon \]

\[ \left| 2\omega + 2 \right| < \varepsilon \]

\[ \left| 2|\omega| + 1 \right| < \varepsilon \]

\[ \left| |\omega| - \frac{1}{2} \right| < \varepsilon \text{ (take } \delta = \frac{\varepsilon}{2} \text{)} \]

So given \( \varepsilon \), let \( \delta = \varepsilon/2 \)

Hence \( \varepsilon \text{, let } \delta = \varepsilon/2 \)

\[ \Rightarrow |\omega + 1| < \varepsilon/2 \]

\[ \Rightarrow 2|\omega| + 1 < \varepsilon \]

\[ \Rightarrow |2\omega + 2| < \varepsilon \]

\[ \Rightarrow |2\omega - 4| < \varepsilon \text{ as needed.} \]