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analysis question

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$\boxed{\frac{25}{62}}$ 1) Prove that:

$$\lim \left(\frac{n}{n^2 + 1} \right) = 0$$

Solution: Let $\epsilon > 0$ be given. Then, by the Archimedean Property there is $k \in \mathbb{N}$ such that $\frac{1}{k} < \epsilon$. Now, if $n \geq k$, then we have,

$$\left| \frac{n}{n^2 + 1} - 0 \right| = \frac{n}{n^2 + 1} \leq \frac{n}{n^2} = \frac{1}{n} < \frac{1}{k} < \epsilon$$

$$\therefore \lim_{n \rightarrow \infty} \frac{n}{n^2 + 1} = 0$$

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