I. $f_n(x) := n \mathbb{1}_{(0,\frac{1}{n})}(x)$, so $f_n(x) \longrightarrow 0 \quad \forall x \qquad f(x) := 0$

but $\int_X f_n \, d\mu = n \cdot \frac{1}{n} = 1 \not\longrightarrow 0$.

II. The same f_n works.

III. <u>No</u> such <u>example</u> exists: if $f_n(x) \to 0$ for $\forall x \in \{1, 2, \ldots, N\}$,

then clearly $\int_X |f_n| \, d\mu = \sum_{i=1}^{N} |f_n(i)| \to 0$ as well.

IV. $f_n(x) := \frac{1}{n}$ for $\forall x \in \{1, 2, \ldots\}$. Then $f_n(x) \xrightarrow{n \to \infty} 0 =: f(x)$ $\forall x$,

but $\int_X f_n \, d\mu = \sum_{i=1}^{\infty} \frac{1}{n} = \infty \quad \forall n$.