1. Give an example of a sequence $f_n$ of functions on $\mathbb{Z}$ which converge pointwise but not uniformly.

2. Give an example of a pointwise convergent sequence $(f_n)$ of functions on $[0, 1]$ for which

$$\lim \int_0^1 f_n \neq \int_0^1 \lim f_n.$$ 

3. Consider the statement: If $f_n \to f$ uniformly, then $f_n^2 \to f^2$ uniformly. First give a counterexample. Second, add a simple hypothesis to make the statement true.

4. Do exercises 2 and 3 on page 245.