Problem 1. On \((\mathbb{R}, \mathcal{B}(\mathbb{R}))\) define two measures, \(\mu\) and \(\nu\), by
\[
\mu(B) = \int_{[0, \infty)} 1_B 2e^{-2x} \, dx,
\]
\[
\nu(B) = \int_{\mathbb{R}} 1_B e^{-2|x|} \, dx,
\]
for \(B \in \mathcal{B}(\mathbb{R})\).

(a) Show that \(\mu \ll \nu\) and find the Radon-Nikodým derivative
\[
\varphi = \frac{d\mu}{d\nu}.
\]

(b) Is \(\nu \ll \mu\)? Explain.

Problems 2-6. Solve the following problems from the book:
page 17: 1.29; page 65: 3.9; page 182: 8.3, 8.11; page 214: 10.8