1. Show that if $f$ and $g$ are absolutely continuous functions in $[a, b]$ and $f'(x) = g'(x)$ a.e., then $f(x) - g(x) = \text{constant}$, for each $x \in [a, b]$.

2. Show that the function $f(x) = x^2 \sin\left(\frac{1}{x^2}\right)$ for $x \neq 0$ and $f(0) = 0$ is not absolutely continuous in $[-1, 1]$.

3. If $f$ is absolutely continuous then it maps sets of measure zero into sets of measure zero.

4. Let $f, g$ be absolutely continuous functions on $[a, b]$. Then the product $fg$ is absolutely continuous, and
\[ \int_a^b f'(x)g(x) \, dx = f(x)g(x)|_{x=a}^{x=b} - \int_a^b f(x)g'(x) \, dx. \]

5. Let $c < a < b < d$. Show that if $f$ is $C^1[a, b]$ with $f(a) = f(b) = 0$ and we define $g(x) = f(x)$ for $x \in [a, b]$ and $g(x) = 0$ for $x \in [c, d] \setminus [a, b]$, then $g$ is absolutely continuous in $[c, d]$.

6. Problems 5 and 8, p. 143.

7. Problems 11, and 12, p. 144.