Discussion problem assignment:

第一题：

1. From Example 4.2, we know that $x(t)=e^{-a|t|}, a>0 \xleftrightarrow{\text{FT}} X(j\omega)=\dfrac{2a}{a^2+\omega^2}$. Write the signal $x(t)$ as the sum of one right-sided signal and one left-sided signal. Find the Fourier transform of the two signals and confirm the FT pair of Example 4.2.

2. Find the Fourier transform of $e^{-a|t|}\,\text{sgn}(t), a>0$ with $\text{sgn}(t)=\begin{cases}+1, & \text{if } t>0\\ -1, & \text{if } t<0\end{cases}$

第二题：

**Question: assume that** $f(t) \xleftrightarrow{\text{FT}} F(j\omega)$

**Define the n-th order moment** $m_n=\int_{-\infty}^{+\infty} t^n f(t)dt$

**Prove that** $(-j)^n m_n=\left.\dfrac{d^n F(j\omega)}{d\omega^n}\right|_{\omega=0}$