These are properties of Fourier series:

**Linearity Property**

If \( x(t) \xrightarrow{\text{fourier series coefficient}} f_{xn} \) & \( y(t) \xrightarrow{\text{fourier series coefficient}} f_{yn} \)

then linearity property states that

\[ a \cdot x(t) + b \cdot y(t) \xrightarrow{\text{fourier series coefficient}} a \cdot f_{xn} + b \cdot f_{yn} \]

**Time Shifting Property**

If \( x(t) \xrightarrow{\text{fourier series coefficient}} f_{xn} \)

then time shifting property states that

\[ x(t - t_0) \xrightarrow{\text{fourier series coefficient}} e^{-j\omega_0 t_0} f_{xn} \]

**Frequency Shifting Property**

If \( x(t) \xrightarrow{\text{fourier series coefficient}} f_{xn} \)

then frequency shifting property states that

\[ e^{j\omega_0 t_0} \cdot x(t) \xrightarrow{\text{fourier series coefficient}} f_{x(n-n_0)} \]

**Time Reversal Property**

If \( x(t) \xrightarrow{\text{fourier series coefficient}} f_{xn} \)

then time reversal property states that

\[ x(-t) \xrightarrow{\text{fourier series coefficient}} f_{-xn} \]

**Time Scaling Property**

If \( x(t) \xrightarrow{\text{fourier series coefficient}} f_{xn} \)

then time scaling property states that

\[ x(at) \xrightarrow{\text{fourier series coefficient}} f_{x} \]

Time scaling property changes frequency components from \( \omega_0 \) to \( a\omega_0 \).

**Differentiation and Integration Properties**

If \( x(t) \xrightarrow{\text{fourier series coefficient}} f_{xn} \)
then differentiation property states that
\[
\frac{dx(t)}{dt} \leftrightarrow \text{fourier series coefficient} \to jn\omega_0 \cdot f_{x_n}
\]

& integration property states that
\[
\int x(t) dt \leftrightarrow \text{fourier series coefficient} \to \frac{f_{x_n}}{jn\omega_0}
\]

**Multiplication and Convolution Properties**

If \( x(t) \leftrightarrow \text{fourier series coefficient} \to f_{x_n} \) & \( y(t) \leftrightarrow \text{fourier series coefficient} \to f_{y_n} \)

then multiplication property states that
\[
x(t) \cdot y(t) \leftrightarrow \text{fourier series coefficient} \to T f_{x_n} \ast f_{y_n}
\]

& convolution property states that
\[
x(t) \ast y(t) \leftrightarrow \text{fourier series coefficient} \to T f_{x_n} \cdot f_{y_n}
\]

**Conjugate and Conjugate Symmetry Properties**

If \( x(t) \leftrightarrow \text{fourier series coefficient} \to f_{x_n} \)

Then conjugate property states that
\[
x(t)^* \leftrightarrow \text{fourier series coefficient} \to f^{*}_{x_n}
\]

Conjugate symmetry property for real valued time signal states that
\[
f^{*}_{x_n} = f^{-x_n}
\]

& Conjugate symmetry property for imaginary valued time signal states that
\[
f^{*}_{x_n} = -f^{-x_n}
\]