13.34) 
Hint: Find the FT of the derivative of \( f(t) \), then use the derivative property to find the FT of \( f(t) \).

\[ F(\omega) = 30 \left( \text{sinc} \left( \frac{3 \omega}{2} \right) \right)^2 \]

13.35) 
Hint: Either (1) treat \( f(t) \) as a sum of three pulses each of duration \( T/3 \), (2) treat \( f(t) \) as a sum of three pulses of duration \( T/3 \), \( 2T/3 \), and \( T \), (3) find the transform of the derivative of \( f(t) \) (which consists of four impulses) and use the derivative property. The result can be expressed in a couple of different ways all of which can be shown to be equal to:

\[ F(\omega) = 12 \text{sinc} \left( \frac{3 \omega}{2} \right) e^{-j\frac{3\omega}{2}} + 8 \text{sinc} \left( \omega \right) e^{-j\omega} + 4 \text{sinc} \left( \frac{\omega}{2} \right) e^{-j\frac{\omega}{2}} \]

13.42) 
\[ a) \quad F(\omega) = 2\pi \left[ e^{j\pi/5} \delta(\omega+5) + e^{-j\pi/5} \delta(\omega-5) \right] \]
\[ b) \quad G(\omega) = \frac{0.5 + j\omega}{(0.5+j\omega)^2 + 25} \]

13.43) 
\[ a) \quad F(\omega) = \pi (1/2 + j3) \delta(\omega+2) + \pi (1/2 - j3) \delta(\omega-2) - (\pi/2) [\delta(\omega+6) + \delta(\omega-6)] \]
\[ b) \quad \text{Hint: Working with the derivative simplifies this problem too. The derivative consists of two shifted rectangular pulses and two shifted impulses.} \]
\[ G(\omega) = \frac{8\pi^2 A}{\omega_1^2} \text{sinc} \left( \frac{2\pi}{\omega_1} \omega \right) - \frac{4\pi^2 A}{\sigma_1^2} \left( \text{sinc} \left( \frac{\omega}{\omega_1} \omega \right) \right)^2 \]

S13.1) 
\[ a) \quad g(t) = -5 e^{2t} u(-t) \]
\[ b) \quad h(t) = 3 e^{-2|t|} \]
\[ c) \quad x(t) = 10 u(-t) [e^t - e^{2t}] \]

S13.3) 
\[ a) \quad f(t) = 5 \text{sgn}(t) - 10 e^{-10t} u(t) \]
b) \[ g(t) = 4e^{2t}u(-t) - 6e^{-3t}u(t) \]

c) \[ h(t) = 2e^{-20t}\sin(30t)u(t) \]

d) \[ y(t) = \frac{1}{4\pi} \]

S13.6) \[ i(t) = 5e^{-t}u(t) - 5e^{-2t}u(t) \]
The simulated response from Ltspice and the theoretical response are both plotted in the graph below. They completely overlap, so the theoretical response is verified.

S13.8) \[ v_o(t) = 1000e^{-t}u(t) - 1000e^{-\frac{5\pi}{4}}u(t) \]
The simulated response from Ltspice and the theoretical response are both plotted in the graph below. They completely overlap, so the theoretical response is verified.