1. **Given:** $f(t) = \begin{cases} 2e^{-3t}, t \geq 0 \\ 4e^{2t}, t < 0 \end{cases}$

Find: $F(\omega)$. Hint: rewrite f(t) as a sum of $u(t)$ and $u(-t)$ functions and use tables.

$f(t) = 2e^{-3t}u(t) + 4e^{2t}u(-t)$

$\boxed{F(\omega) = \frac{2}{3+j\omega} + \frac{4}{2-j\omega}}$ or could simplify $\frac{2(2-j\omega)+4(3+j\omega)}{(3+j\omega)(2-j\omega)}$

$= \boxed{\frac{16+j2\omega}{6-j\omega+\omega^2}}$

2. **Given:** $H(\omega) = \frac{6}{\omega^2+4}$

Find: $h(t)$

$H(\omega) = \frac{6}{\omega^2+4}$ like $\frac{2a}{\omega^2+a^2} \Leftrightarrow e^{-a|t|}$

$= \frac{2 \cdot 2 \cdot \frac{6}{4}}{\omega^2+2^2}$

$h(t) = \frac{6}{4}e^{-2|t|}$

$= \boxed{\frac{3}{2}e^{-2|t|}}$