**Sample Final Problem 3**

LaPlace transform of $f(t) = t + 3 + e^{-t} \sin 2t$

If just asked to do this without having to use the definition (most likely), then it's not a long problem. We're looking for $\mathcal{L}\{t + 3 + e^{-t} \sin 2t\}$, so we apply linearity: $\mathcal{L}\{t\} + 3\mathcal{L}\{1\} + \mathcal{L}\{e^{-t} \sin 2t\}$. The first two pieces are just done using the table directly, and the last part is done using the translation property. So, here is the result: $\frac{1}{s^2} + \frac{3}{s} + \frac{2}{(s+1)^2 + 4}$.