Math 513-132 Quiz 3 (A)

Name:.....Sec#:.....ID#:.....Ser#:.....

Q.1: Use $\mathcal{F}[e^{-at}\sin(bt)H(t)] = \dfrac{b}{(a+iw)^2+b^2}$ and Parseval's equality $\int\limits_{-\infty}^{\infty} |f(t)|^2 dt = \frac{1}{2\pi}\int\limits_{-\infty}^{\infty} |F(w)|^2 dw$ to show that $\int\limits_{-\infty}^{\infty} \dfrac{1}{(x^2+a^2-b^2)^2+4a^2b^2}dx = \dfrac{\pi}{2a(a^2+b^2)}$

Q.2: Verify that $\mathcal{F}[\sin(w_0 t)H(t)] = \dfrac{w_0}{w_0^2 - w^2} + \dfrac{\pi}{2}[\delta(w + w_0) + \delta(w - w_0)]$.

Hint: $\mathcal{F}(e^{iw_0 t}) = 2\pi\delta(w - w_0)$