**(1)** Two different wave functions, $\psi_1(x)$ and $\psi_2(x)$, are shown below. Consider the following four combinations of states:

(a) $\psi_1(x)$ (b) $\psi_2(x)$ (c) $\psi_1(x) + \psi_2(x)$ (d) $\psi_1(x) + i\psi_2(x)$

Assume each state (or combination of states) is properly normalized.

(a) Rank the states, from lowest to highest, based on the expectation value of $x$ for each state.

Smallest value of $\langle x \rangle$ c a = b = d Largest value of $\langle x \rangle$

(b) Rank the states, from lowest to highest, based on the uncertainty in $x$ for each state.

Smallest value of $\Delta x$ c a = b = d Largest value of $\Delta x$