Working with Hydrogen Atom Orbitals

Complete the following steps for each of the H-atom orbitals pictured below:
1. Identify the orbitals. Be sure to include the orientation of the orbital (i.e., 3pₓ, etc.).
2. List the values of the 3 quantum numbers \( n, l, \) and \( m_l \).
3. Determine the number and type of nodes for each orbital.
4. Draw plots of the radial portion of the wave function, \( R(r) \), the probability density, \( R(r)^2 \), and the radial probability distribution, \( 4\pi r^2 R(r)^2 \), vs. \( r \) for these orbitals.

A.
B.

\[ R(r) \]

\[ \frac{r}{a_0} \]

\[ R(r)^2 \]

\[ \frac{r}{a_0} \]

\[ 4\pi r^2 R(r)^2 \]

\[ \frac{r}{a_0} \]
C.

\[ R(r) \]

\[ R(r)^2 \]

\[ 4\pi r^2 R(r)^2 \]

\[ r/a_0 \]
D.

\[ R(r) \]

\[ R(r)^2 \]

\[ 4\pi^2 R(r)^2 \]