

Table 6.1. Radial functions  $R_{nl}$  for the hydrogen-like atom for  $n = 1$  to 6. The variable  $\rho$  is given by  $\rho = 2Zr/na_0$

$$\begin{aligned}
 R_{10} &= 2(Z/a_0)^{3/2} e^{-\rho/2} \\
 R_{20} &= \frac{(Z/a_0)^{3/2}}{2\sqrt{2}} (2 - \rho) e^{-\rho/2} \\
 R_{21} &= \frac{(Z/a_0)^{3/2}}{2\sqrt{6}} \rho e^{-\rho/2} \\
 R_{30} &= \frac{(Z/a_0)^{3/2}}{9\sqrt{3}} (6 - 6\rho + \rho^2) e^{-\rho/2} \\
 R_{31} &= \frac{(Z/a_0)^{3/2}}{9\sqrt{6}} (4 - \rho)\rho e^{-\rho/2} \\
 R_{32} &= \frac{(Z/a_0)^{3/2}}{9\sqrt{30}} \rho^2 e^{-\rho/2} \\
 R_{40} &= \frac{(Z/a_0)^{3/2}}{96} (24 - 36\rho + 12\rho^2 - \rho^3) e^{-\rho/2} \\
 R_{41} &= \frac{(Z/a_0)^{3/2}}{32\sqrt{15}} (20 - 10\rho + \rho^2)\rho e^{-\rho/2} \\
 R_{42} &= \frac{(Z/a_0)^{3/2}}{96\sqrt{5}} (6 - \rho)\rho^2 e^{-\rho/2} \\
 R_{43} &= \frac{(Z/a_0)^{3/2}}{96\sqrt{35}} \rho^3 e^{-\rho/2} \\
 R_{50} &= \frac{(Z/a_0)^{3/2}}{300\sqrt{5}} (120 - 240\rho + 120\rho^2 - 20\rho^3 + \rho^4) e^{-\rho/2} \\
 R_{51} &= \frac{(Z/a_0)^{3/2}}{150\sqrt{30}} (120 - 90\rho + 18\rho^2 - \rho^3)\rho e^{-\rho/2} \\
 R_{52} &= \frac{(Z/a_0)^{3/2}}{150\sqrt{70}} (42 - 14\rho + \rho^2)\rho^2 e^{-\rho/2} \\
 R_{53} &= \frac{(Z/a_0)^{3/2}}{300\sqrt{70}} (8 - \rho)\rho^3 e^{-\rho/2} \\
 R_{54} &= \frac{(Z/a_0)^{3/2}}{900\sqrt{70}} \rho^4 e^{-\rho/2} \\
 R_{60} &= \frac{(Z/a_0)^{3/2}}{2160\sqrt{6}} (720 - 1800\rho + 1200\rho^2 - 300\rho^3 + 30\rho^4 - \rho^5) e^{-\rho/2}
 \end{aligned}$$