In[1]:= \[ f = Table[\exp b^2, \{b, 8n\}, \{n, 0, 3\}]; \]

Out[1]= \[ \begin{array}{c}
  \text{Overlap matrix } L
\end{array} \]

In[2]:= \[ F \text{ Overlap matrix } L \]

In[3]:= \[ s = Table[Integrate[\pi r^2 f \exp D, \{r, 0, \text{Infinity}\}], \{8n, 1, 4\}]; \]

Out[3]= \[ \begin{array}{c}
  \text{Table} \text{Laplace in Spherical Coordinates } L
\end{array} \]

In[4]:= \[ TableForm@s \]

Out[4]= \[ \begin{array}{c}
  \text{TableForm}\[D]
\end{array} \]

In[5]:= \[ F \text{ Laplacian in Spherical Coordinates } L \]

In[6]:= \[ <<Calculus\VectorAnalysis\] \]

In[7]:= \[ F \text{ Function of } r \text{ only } \text{ i.e. spherically symmetric } L \]
\[ \text{Laplacian @} \theta, \phi \]

General: spell! Possible spelling error: new symbol name "\( \theta \)" is similar to existing symbol "\( \theta \)".

\[ \text{Csc} @} \theta \text{DH} r \sin \theta \text{DH} r \theta \text{DH} r^2 \sin \theta \text{DH} r \phi \text{DH} r^2 \]

\[ r^2 \]

\[ \text{Note the trig terms drop out since } g \text{ is not a function of } \theta \text{ and } \phi \]

\[ \text{TrigExpand @} \]

\[ \text{Hamiltonian in spherical coordinates} \]

\[ \text{hamiltonian @} \text{D}@\psi_1 := - \frac{\psi_1 \text{D} r @ \psi_1 \text{D} r^2 \psi_1 \text{D} r \psi_1 \text{D} \psi_1 \text{D} \psi_1}{r^2} + \psi_1 \]

\[ \text{We get } 4 \pi \text{ from the integration } \theta \text{ and } \phi, \text{ and } r^2 \text{ also from the}
\]

\[ \text{Jacobian of the transformation from cartesian to spherical coordinates} \]

\[ \text{h=} \text{Table @} \text{Integrate @} \text{4Pi r}^2 \text{D}@\text{hamiltonian @} \text{D}@\text{D}@\psi_1 \text{D} @ \psi_1 \text{D} @ \psi_1, 8r, 0, \text{Infinity} \]

\[ \text{Simplify @} \text{, Re @} \text{D}>0 \text{D} @ \psi_1, 8m, 1, 4<, 8n, 1, 4< \text{D} \]

\[ \text{TableForm @} \]

\[ \text{TableForm} / @ \text{D} \]