$P_1^0$ and $P_1^1$

$\cos \theta$ and $\sin \theta$
\[
\begin{align*}
P_2^0 &= \frac{1}{2} (3 \cos^2 \theta - 1) \\
P_2^1 &= 3 \cos \theta \sin \theta \\
P_2^2 &= 3 \sin^2 \theta
\end{align*}
\]
\[
\begin{align*}
P_3^0 & : \frac{1}{2} (5 \cos^3 \theta - \cos \theta) \\
P_3^1 & : \frac{3}{2} \sin \theta (5 \cos^2 \theta - 1) \\
P_3^2 & : 15 \sin^2 \theta \cos \theta \\
\end{align*}
\]