

Please read Griffiths Introduction to Electrodynamics
page 152-153.

$$\frac{1}{z} \Leftrightarrow \frac{1}{R}$$

Insert series expansion of $\frac{1}{R}$ in terms of powers of $\frac{1}{r}$ into the expression for $V(\underline{r})$ to obtain

$$V(\underline{r}) = \frac{1}{4\pi\epsilon_0} \sum_{n=0}^{\infty} \frac{1}{r^{(n+1)}} \int_V (r')^n P_n(\cos\alpha) \rho(\underline{r}') d\tau'$$

N.B. r is a constant as far as the integration is concerned.

Exercise for you!