$\Phi(\mathbf{r})$, To Second Order (x^2, y^2, z^2 Terms), Using the General Taylor Series Expansion, As an Approximation To the Function, Near the Origin, Labeled As $\Phi_{\text{approx.}}(\mathbf{r})$. Calculate the Average Value Of the Function, Labeled As $\bar{\Phi}(\mathbf{0})$, About the Origin, By Integrating this Approximation Of the Function, $\Phi_{\text{approx.}}(\mathbf{r})$, Over a Cube Of Side Lengths a, Where the Average Value Of the Function At the Origin Is $\bar{\Phi}(\mathbf{0}) = \frac{1}{a^3} \int_{-a/2}^{a/2} \int_{-a/2}^{a/2} \int_{-a/2}^{a/2} dx dy dz \Phi_{\text{approx.}}(\mathbf{r})$. From the Average Value Integral, you should be able to Isolate the Laplacian Of the Function, $\nabla^2 \Phi(\mathbf{r})\big|_{\mathbf{r}=0}$, Evaluated At the Origin. As a Result of this, **Express the Laplacian Of the Function, $\nabla^2 \Phi(\mathbf{r})\big|_{\mathbf{r}=0}$, Evaluated At the Origin, In Terms Of a Constant Factor Times the Difference Between the Average Value Of the Function, $\bar{\Phi}(\mathbf{0})$, And the Function, $\Phi(\mathbf{0})$,** all **Evaluated At the Origin.** Note That this Expression Becomes Exact In the Limit That the Size Of the Cube Length Goes To Zero, $a \to 0$. The Objective Of this Exercise Is To Demonstrate the Fact That the Laplacian Of a Function At Any Point Can Be Interpreted As Being Directly Related To the Difference Of the Average Value Of a Function Around the Point And the Function Itself At that Point. **Note: Make Sure To Write Out All the Terms In your Second Order Vector Taylor Series Expansion Of Function, Before Performing the Averaging Integral.**