With the approximate form of Laplace's equation:

$$\frac{V(x_i + a) - 2V(x_i) + V(x_i - a)}{a} \approx 0$$

What is a the appropriate estimate of $V(x_i)$?

A. $1/2(V(x_i + a) - V(x_i - a))$
B. $1/2(V(x_i + a) + V(x_i - a))$
C. $a/2(V(x_i + a) - V(x_i - a))$
D. $a/2(V(x_i + a) + V(x_i - a))$
E. Something else


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To investigate the convergence, we must compare the estimate of V before and after each calculation. For our 1D relaxation code, V will be a 1D array. For the kth estimate, we can compare V_k against its previous value by simply taking the difference.

Store this in a variable called `err`. What is the type for `err`?

A. A single number
B. A 1D array
C. A 2D array
D. ???

The Method of Relaxation also works for Poisson's equation (i.e., when there is charge!).

Given, $\nabla^2 V \approx \dfrac{V(x+a) - 2V(x) + V(x-a)}{a^2}$

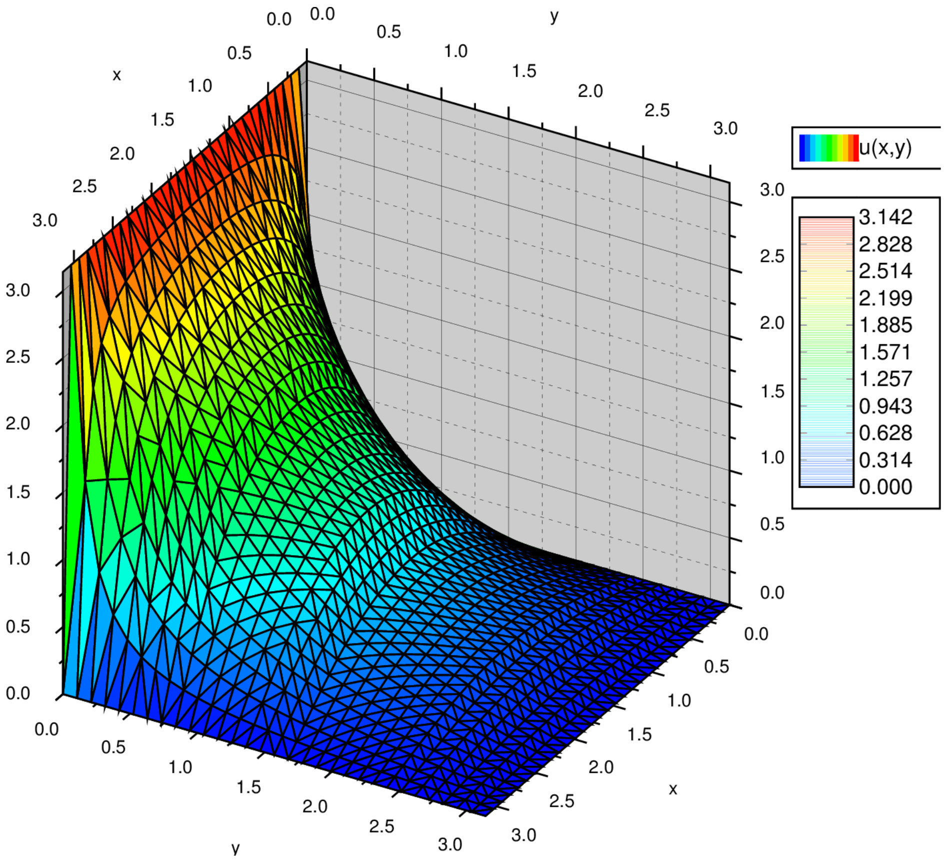
Which equations describes the appropriate "averaging" that we must do:

A. $V(x) = \dfrac{1}{2}(V(x+a) - V(x-a))$

B. $V(x) = \dfrac{\rho(x)}{\varepsilon_0} + \dfrac{1}{2}(V(x+a) + V(x-a))$

C. $V(x) = \dfrac{a^2\rho(x)}{2\varepsilon_0} + \dfrac{1}{2}(V(x+a) + V(x-a))$

SEPARATION OF VARIABLES (CARTESIAN)



Say you have three functions $f(x)$, $g(y)$, and $h(z)$. $f(x)$ depends on x but not on y or z. $g(y)$ depends on y but not on x or z. $h(z)$ depends on z but not on x or y.

If $f(x) + g(y) + h(z) = 0$ for all x, y, z, then:

A. All three functions are constants (i.e. they do not depend on x, y, z at all.)
B. At least one of these functions has to be zero everywhere.
C. All of these functions have to be zero everywhere.
D. All three functions have to be linear functions in x, y, or z respectively (such as $f(x) = ax + b$)

If our general solution contains the function,

$$X(x) = Ae^{\sqrt{c}x} + Be^{-\sqrt{c}x}$$

What does our solution look like if $c < 0$; what about if $c > 0$?

A. Exponential; Sinusoidal
B. Sinusoidal; Exponential
C. Both Exponential
D. Both Sinusoidal
E. ???

Our example problem has the following boundary conditions:

- $V(0, y > 0) = 0; V(a, y > 0) = 0$
- $V(x_{0 \to a}, y = 0) = V_0; V(x, y \to \infty) = 0$

If $X'' = c_1 X$ and $Y'' = c_2 Y$ with $c_1 + c_2 = 0$, which is constant is positive?

A. c_1
B. c_2
C. It doesn't matter either can be