Excercise 9

$$t^n = t_0 + n\Delta t$$

$$x_i = x_0 + i\Delta x$$

$$\frac{\partial^2 U}{\partial x^2} \approx \frac{U_{i+1}^n - 2U_i^n + U_{i-1}^n}{\Delta x^2} + \Theta(\Delta x)$$

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Eq. 33: $\frac{\partial U}{\partial z} = \frac{U(z_i + \Delta z) - U(z_i - \Delta z)}{2\Delta z} + \Theta(\Delta z^2)$

U_{ijk}^n :

$$\frac{\partial U}{\partial z} \approx \frac{U_{k+1}^n - U_{k-1}^n}{2\Delta z}$$

$$\therefore \frac{\partial U}{\partial z} \approx \frac{U_{i,j,k+1}^n - U_{i,j,k-1}^n}{2\Delta z}$$