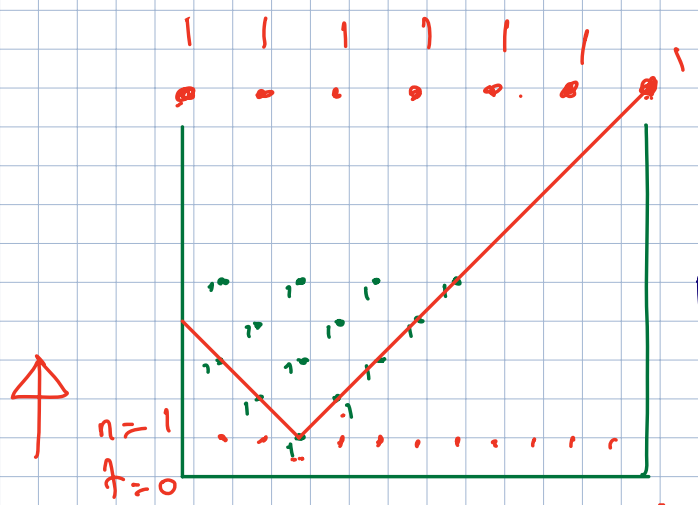
13. Show that $u_{tt} = u_{xx}$ implies

$$u_m^{n+1} = u_{m+1}^n + u_{m-1}^n - u_m^{n-1}.$$



Here's a typical pattern for zero b.c.s and $u_m^1 = \delta_{0i}$. Then

$$|\text{error}| = \left|\sum_{\text{half}} u_i^1\right|$$

$$\leq \frac{1}{2} M \|(u_i^1)\|_{\infty}$$

$$= \frac{1}{2} M \epsilon.$$