

## Handling Nuemann BCs

1st order method

$$\left\{ \begin{array}{l} \frac{u_1 - u_0}{h} = \alpha \\ \text{Error is } \mathcal{O}(h) \end{array} \right.$$

2nd order method

Ghost point method  
1-sided Forward difference

$$\left\{ \begin{array}{l} u'(x_0) = \frac{-3u_0 + 4u_1 - u_2}{2h} + \mathcal{O}(h^2) \\ \text{The matrix is no longer tridiagonal} \end{array} \right.$$