$$\frac{d^2\phi}{dx^2} = -\frac{\rho}{\epsilon_r}$$

$$\phi'(0) + \phi(0) = 5$$

$$\phi(3) = 2$$

$$\rho = 1$$

$$\epsilon_r(x) = \begin{cases} 10 & \text{dla } x \in [0,1] \\ 5 & \text{dla } x \in (1,2] \\ 1 & \text{dla } x \in (2,3] \end{cases}$$

$$\phi''(x) \cdot v(x) = -\frac{\rho}{\epsilon_r(x)} \cdot v(x) \Big| \int$$

$$\int \phi''(x)\, v(x)\,dx = -\int \frac{\rho}{\epsilon_r(x)} v(x)\,dx$$

$$\int \phi''(x) v(x) = \begin{vmatrix} u = v(x) & u' = v'(x) \\ w' = \phi''(x) & w = \phi'(x) \end{vmatrix} = v(x)\cdot\phi'(x) - \int v'(x)\cdot\phi'(x)\,dx$$

$$\int_0^3 \phi''(x)\, v(x)\,dx = v(3)\cdot\phi'(3) - v(0)\cdot\phi'(0) - \int_0^3 v'(x)\cdot\phi'(x)\,dx$$

warunek Dirichleta w $3 \to v(3) = 0$

$$\phi'(0) = 5 - \phi(0)$$

$$-v(0)\cdot(5 - \phi(0)) - \int_0^3 v'(x)\cdot\phi'(x)\,dx = -\int_0^3 \frac{\rho}{\epsilon_r}\cdot v(x)\,dx$$

$$\underbrace{v(0)\cdot\phi(0) - \int_0^3 v'(x)\cdot\phi'(x)\,dx}_{B(\phi, v)} = \underbrace{5\cdot v(0) - \int_0^3 \frac{\rho}{\epsilon_r}\cdot v(x)\,dx}_{L(v)}$$

$$B(\phi, v) = B(w + \tilde{\phi}, v) = B(w, v) + B(\tilde{\phi}, v)$$

$$B(w, v) + B(\tilde{\phi}, v) = L(v)$$

$$B(w, v) = L(v) - B(\tilde{\phi}, v)$$

$\hat{\phi}$ to funkcja spełniająca warunek brzegowy,

tzn. $\hat{\phi}(3) = 2$

możemy zatem przyjąć, że $\hat{\phi} = 2e_n$