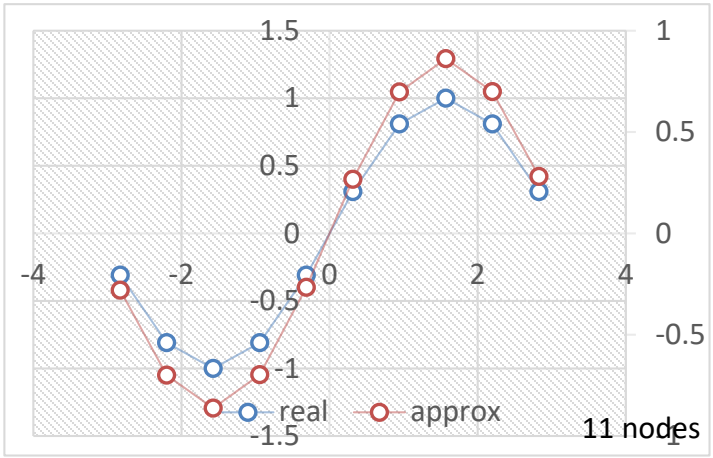
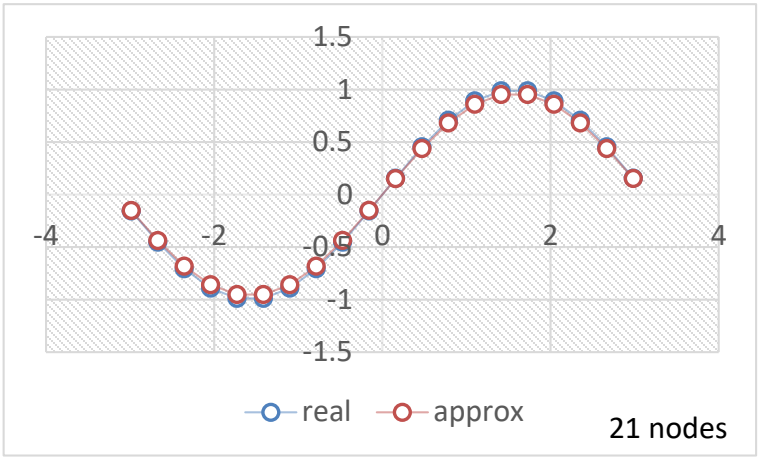
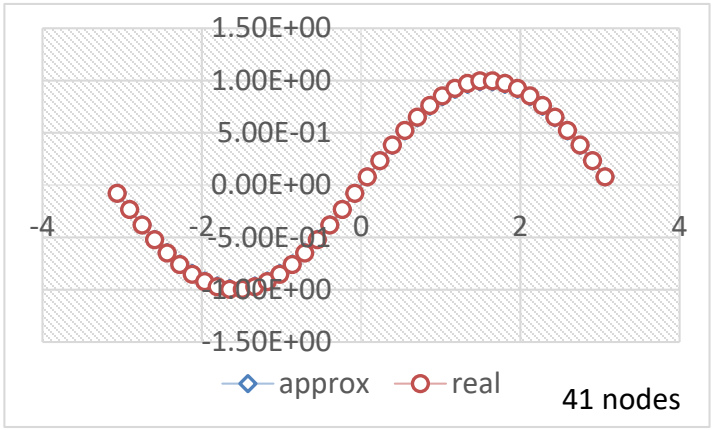
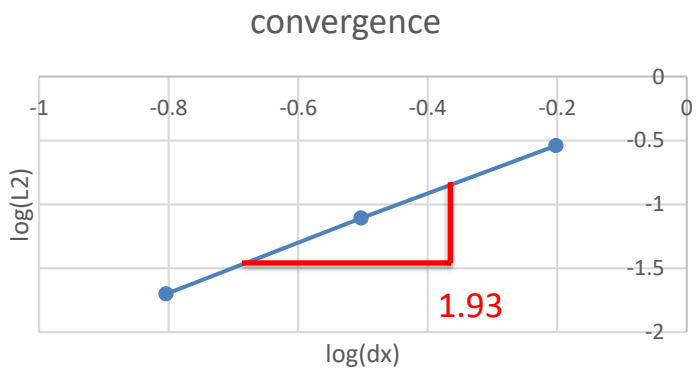
Mesh-free methodology

- 1D approximation: y=sin(x) $x \in [-\pi, \pi]$



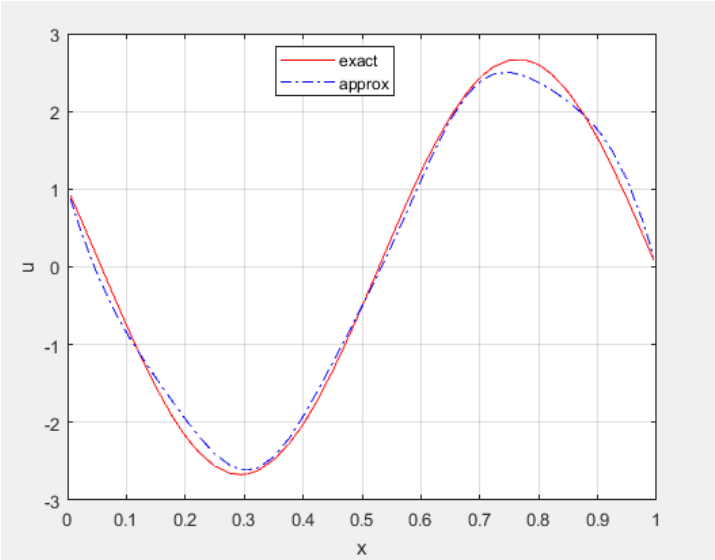




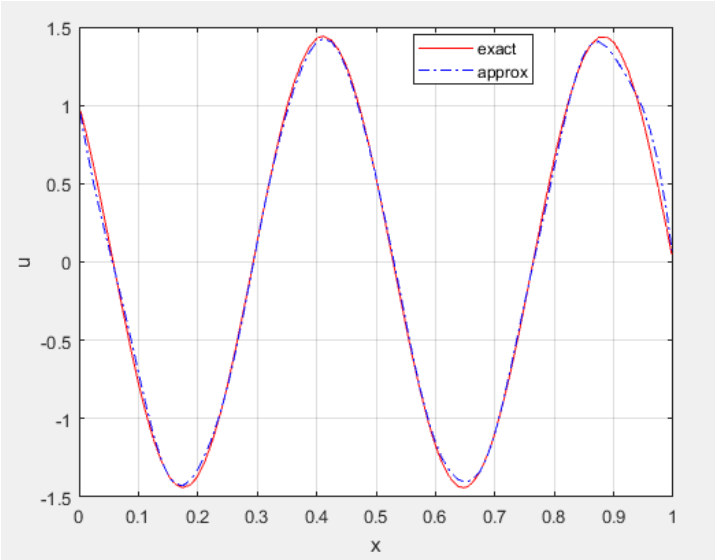


Mesh-free methodology

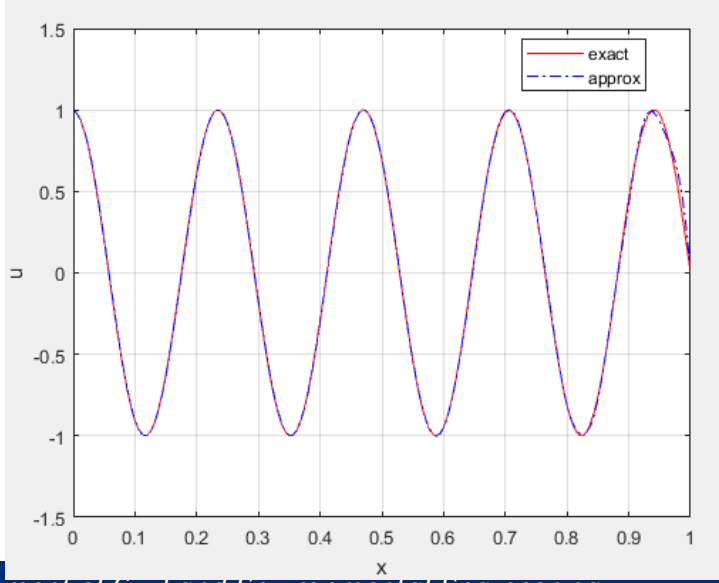
- 1D ODE: $u_{,xx}+ku^2 = 0$ $\quad x \in [0,1]$



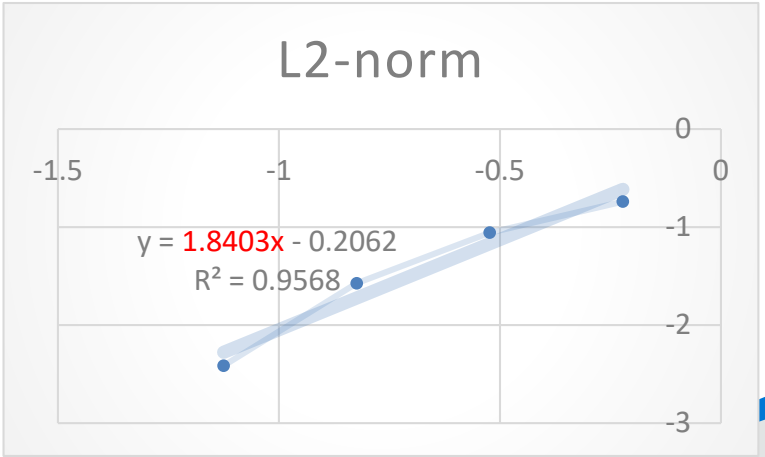
11 nodes



21 nodes

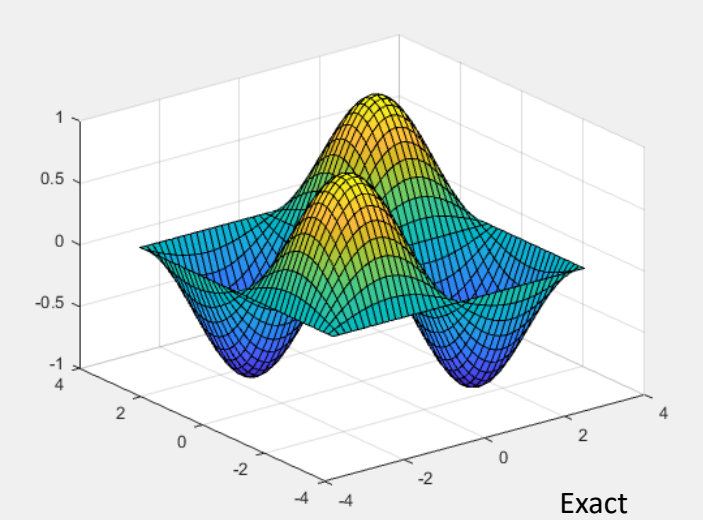


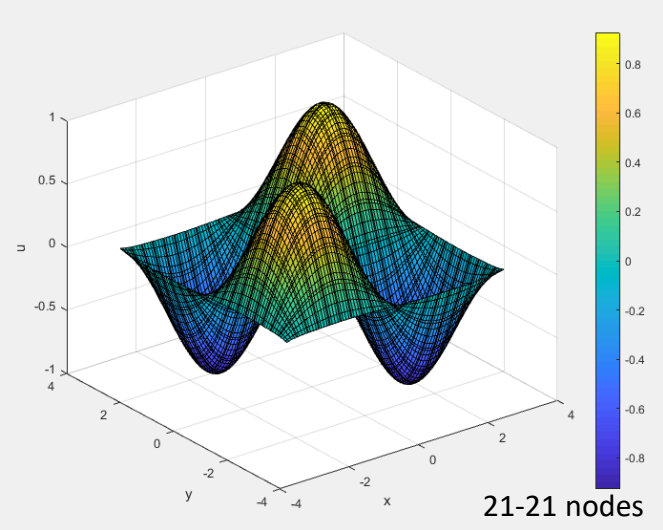
41 nodes

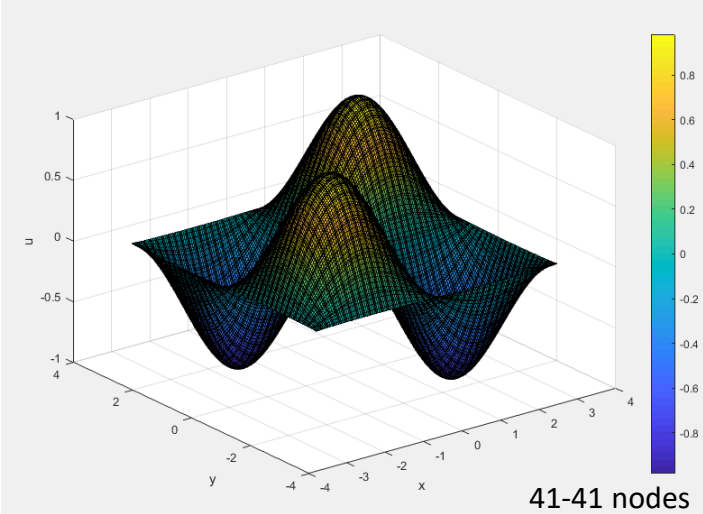


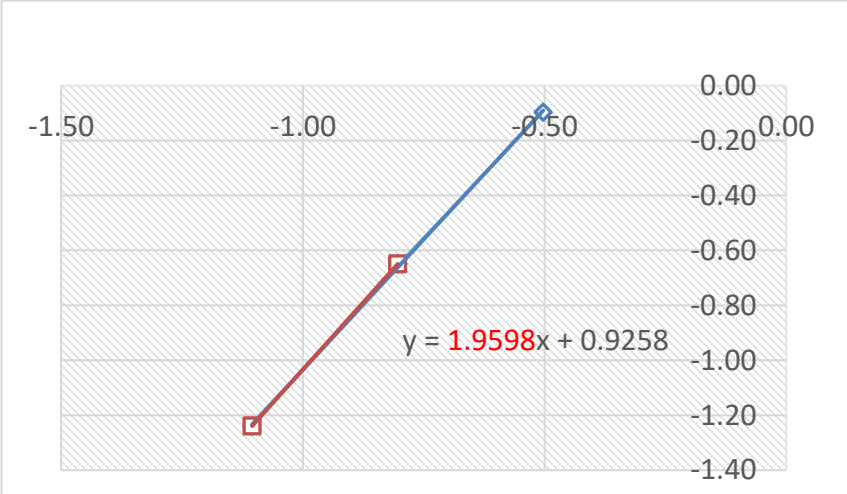
Mesh-free methodology

- 2D approximation: u=sin(x)*sin(y) $(x, y) \in [-\pi, \pi] \bullet [-\pi, \pi]$









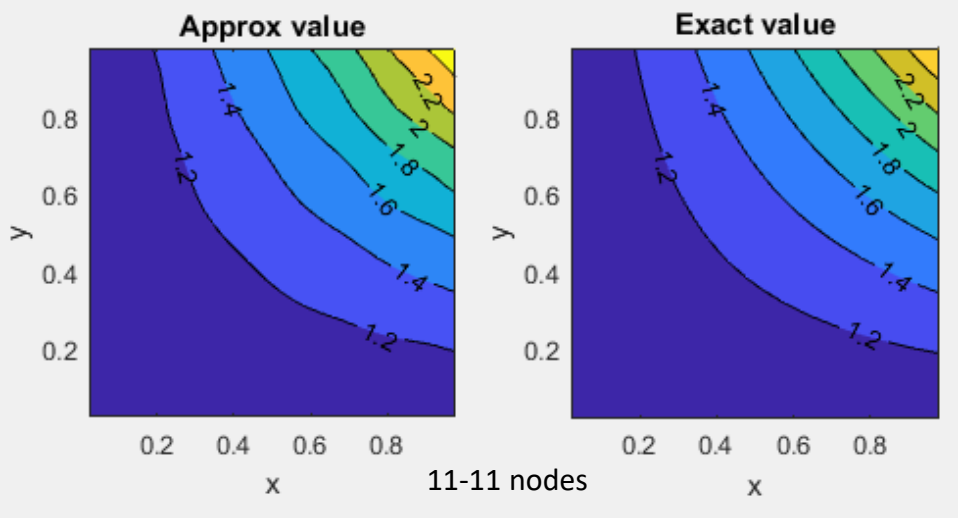
Mesh-free methodology

$$\Delta u - f = 0; (x, y) \in [0,1] \times [0,1]$$

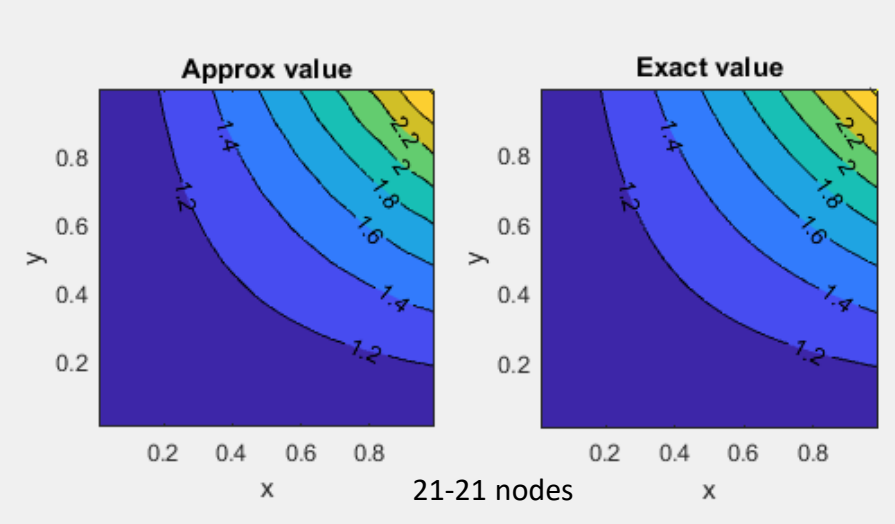
$$u = e^{xy} \; @(\partial\Omega_g = \partial\Omega)$$

$$f = (x^2 + y^2)e^{xy}$$

- 2D PDE

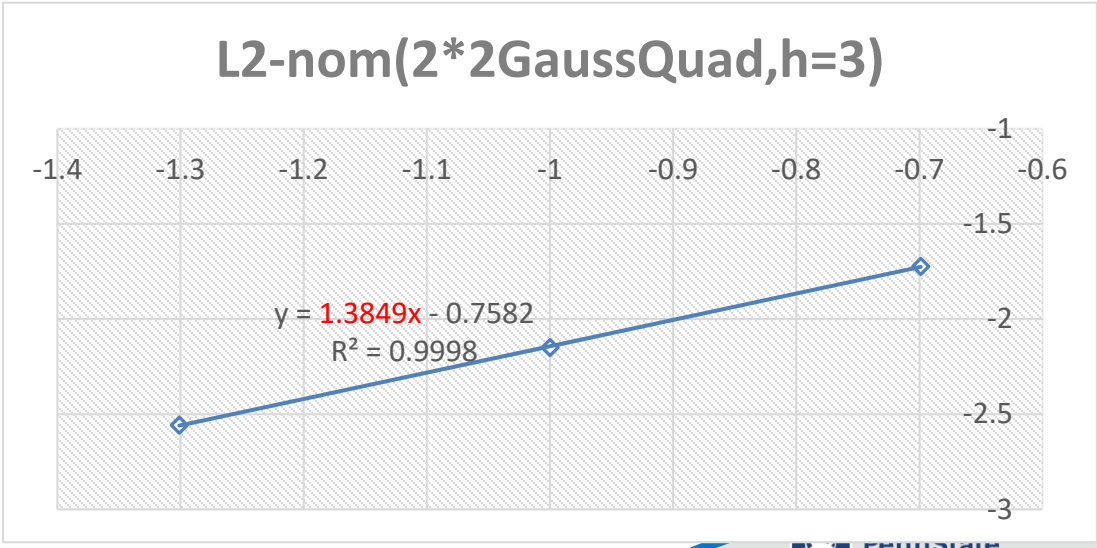


11-11 nodes



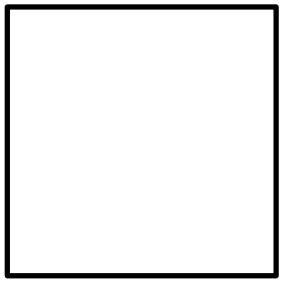
21-21 nodes

2D PDE BC imposed by transformation, Penalty, Lagrangian Multiplier, and Nitsche's method.



Mesh-free methodology

- 2D elasticity: patch test



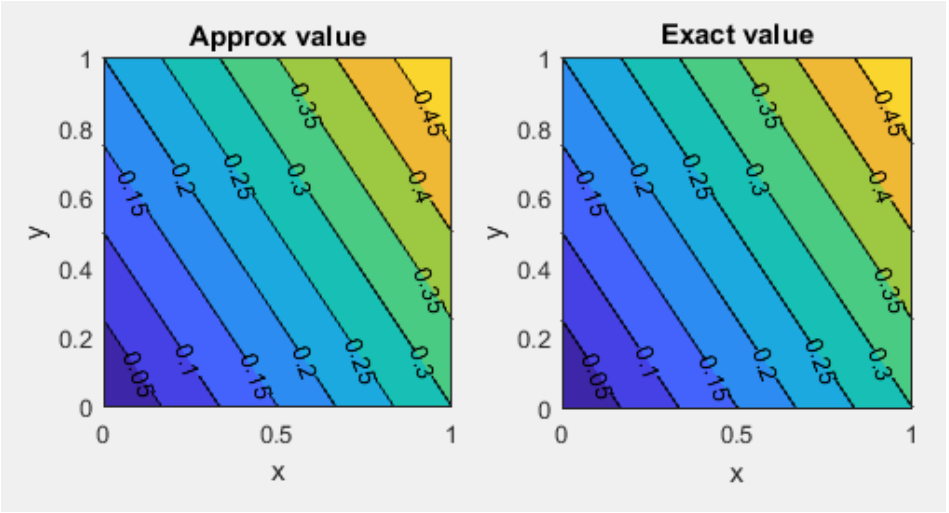
$$\Omega = [0,2]\cdot[0,2];$$

$$\bar{\mathbf{u}} = \begin{pmatrix} 0.2x + 0.3y \\ 0.1x + 0.4y \end{pmatrix}$$ all essential boundary.

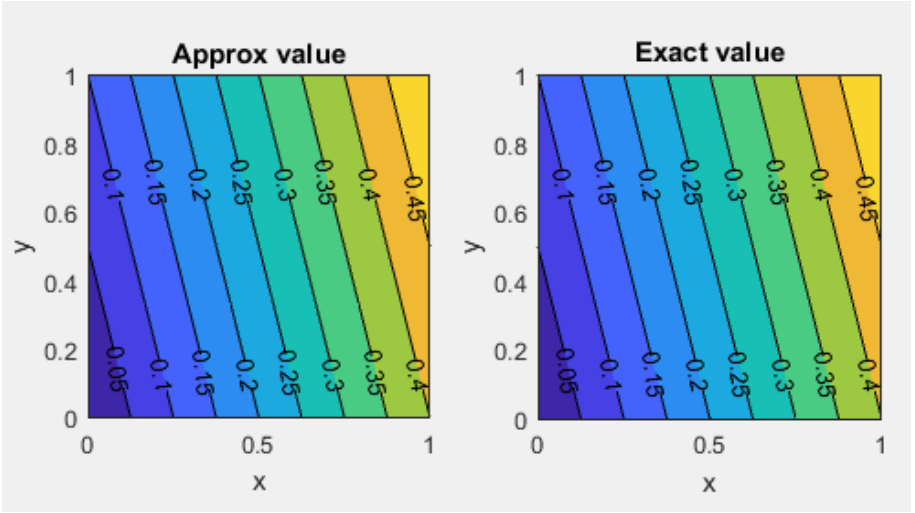
Exact solution:

$$u = 0.2x + 0.3y;$$

$$v = 0.1x + 0.4y.$$



Disp_u



Disp_v