Week 11: Two dimensional Vector field and Eigen value problems

Assignment 10

Due on 2020-11-26, 23:59 IST.

Problem 1

Figure 1

1. Which of the following represents the correct expression for the shape functions (see Fig. 1)?
   a) \( N_1 = \frac{x}{x_1}, \quad N_2 = \frac{x}{x_2}, \quad N_3 = \frac{x}{x_3} \)
   b) \( N_1 = \frac{x}{x_1} - \frac{x_2}{x_2}, \quad N_2 = \frac{x}{x_2} - \frac{x_3}{x_3} \)
   c) \( N_1 = \frac{x}{x_1} - \frac{x_2}{x_2}, \quad N_2 = \frac{x}{x_2} - \frac{x_3}{x_3} \)
   d) \( N_1 = \frac{x}{x_1} - \frac{x_2}{x_2}, \quad N_2 = \frac{x}{x_2} - \frac{x_3}{x_3} \)

   2 points

2. What is the value of \( \sigma_{yy} \) (if the stress is given as \( \sigma \sigma' \))?
   a) \( 10 \) MPa
   b) \( 15 \) MPa
   c) \( 20 \) MPa

   2 points

3. What is the value of \( \sigma_{xx} \) (if the stress is given as \( \sigma \sigma' \))?
   a) \( 20 \) MPa
   b) \( 25 \) MPa
   c) \( 30 \) MPa

   2 points

4. Which of the following represent the displacement conditions for this problem?
   a) \( u(x) = 0, \quad v(x) = 0 \)
   b) \( u(x) = x, \quad v(x) = 0 \)
   c) \( u(x) = x, \quad v(x) = x \)

   2 points

5. Calculate the value of \( u_{xx} \) at the given point.

   2 points

6. Calculate the value of \( u_{yy} \) at the given point.

   2 points

7. Calculate the value of \( v_{xx} \) at the given point.

   2 points

8. Calculate the value of \( v_{yy} \) at the given point.

   2 points

9. Calculate the value of \( \theta \) at the given point.

   2 points