Unit 5 - Week 2: One dimensional Finite Element Analysis

Assignment 2

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-09-30, 23:59 IST.

Answer the question from "a" to "b" (i.e 1 to 3) with the help of below statement:

The integration $\int_{-5}^{7}(x^5+2x^2)dx$ is solved with numerical integration.

(a) For numerical integration you can use two point Gaussian Quadrature rule. In [-1,1] domain for two point Gaussian Quadrature two gauss points and corresponding weights are

$(\xi_1, w_1) = (-0.57735, 1);$
$(\xi_2, w_2) = (0.57735, 1);$

1) What is the value of integration when solved with two point Gaussian Quadrature rule?

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 10401,10406

2 points

(b) In [-1,1] domain for three point Gaussian Quadrature three guass points and corresponding weights are given as

$(\xi_1, w_1) = (-0.7745966, 0.55555);$
$(\xi_2, w_2) = (0.77459663, 0.55555);$
$(\xi_3, w_3) = (0.0, 0.8888888);$

2) What is the value of integration when solved with three point Gaussian Quadrature rule?

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 17313,17319

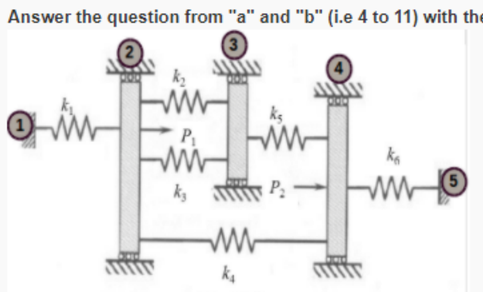
2 points

3) In Gaussian Quadrature rule in the interval [-1,1] the variable x is replaced with _____. ***2 points***

A. $1+6\xi$
B. ξ
C. $1-6\xi$
D. 6ξ

No, the answer is incorrect.
Score: 0
Accepted Answers:
A. $1+6\xi$

Answer the question from "a" and "b" (i.e 4 to 11) with the help of below statement:



Consider the system of linear elastic springs attached between three bars and two supports as shown in Fig. Stiffness of the six springs are k_1 = 60 N/mm, k_2 = 80 N/mm, k_3 = 50 N/mm, k_4 = 150 N/mm, k_5 = 120 N/mm, and k_6 = 180 N/mm, where as the forces are P_1 = 100 N, P_2 = 80 N. u_1, u_2, u_3, u_4 and u_5 are the displacements at the points 1, 2, 3, 4 and 5 respectively. If the finite element equation is given as $[K]\{u\} = \{F\}$, then answer the following.

(a) After imposition of the boundary condition we get the reduced stiffness matrix $[K]$ and reduced load vector $\{F\}$, then answer the following:

4) What is size of the reduced stiffness matrix? ***2 points***

A. 5×5
B. 4×4
C. 3×3
D. 6×6

No, the answer is incorrect.
Score: 0
Accepted Answers:
C. 3×3

5) What is the value of element $K(2,2)$ of the reduced stiffness matrix? ***2 points***

A. 250 N/mm
B. 150 N/mm
C. 200 N/mm
D. 260 N/mm

No, the answer is incorrect.
Score: 0
Accepted Answers:
A. 250 N/mm

6) What is the value of element $K(3,1)$ of the reduced stiffness matrix? ***2 points***

A. 150 N/mm
B. -150 N/mm
C. 200 N/mm
D. -120 N/mm

No, the answer is incorrect.
Score: 0
Accepted Answers:
B. -150 N/mm

7) What is the value of element $K(3,3)$ of the reduced stiffness matrix? ***2 points***

A. 150 N/mm
B. -130 N/mm
C. 450 N/mm
D. 120 N/mm

No, the answer is incorrect.
Score: 0
Accepted Answers:
C. 450 N/mm

8) The reduced load vector $\{F\}$ is _____. ***2 points***

A. $\begin{Bmatrix} 100 \\ 0 \\ 80 \end{Bmatrix}$
B. $\begin{Bmatrix} 0 \\ 100 \\ 80 \end{Bmatrix}$
C. $\begin{Bmatrix} 0 \\ 80 \\ 100 \end{Bmatrix}$
D. $\begin{Bmatrix} 100 \\ 80 \\ 0 \end{Bmatrix}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
A. $\begin{Bmatrix} 100 \\ 0 \\ 80 \end{Bmatrix}$

(b) After solving the finite element equation

9) The value of displacement (u_2) at the point 2 is _____mm

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.90,0.92

2 points

10) The value of displacement (u_3) at the point 3 is _____ mm.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.79,0.81

2 points

11) The value of displacement (u_4) at the point 4 is _____ mm.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.68,0.71

2 points