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NPTEL

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Courses » Computational Hydraulics

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## Unit 6 - Week 5

### Course outline

How to access the portal

Week 1

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Week 5

- Lecture 21: Mesh-Tree Method : Polynomial Interpolation Method
- Lecture 22: Mesh -Free Method : Moving Least Squares Method
- Lecture 23: Mesh-Free Method : Space-Time Moving Least Squares Method
- Lecture 24: Numerical Method : Matrix Structure and Scilab
- Lecture 25: Algebraic Equation:Gauss Elimination Method
- Quiz : Week 5 Assignment
- Lecture Material
- Scilab Code

### Week 5 Assignment

The due date for submitting this assignment has passed. **Due on 2017-09-14, 23:59 IST.**

#### Submitted assignment

1) In Polynomial Interpolation Method, derivative of weight function at a point depends on 1 point

- Derivative of the polynomial basis
- Points in the support domain including the point under consideration
- Points in the support domain excluding the point under consideration

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*Derivative of the polynomial basis*

*Points in the support domain including the point under consideration*

2) Moving Least Squares method utilizes 1 point

- Weighted error minimization approach
- Weighted error maximization approach

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*Weighted error minimization approach*

3) Weight function in Moving Least Squares method should be 1 point

- Positive valued within support domain
- Zero outside support domain
- Negative valued outside support domain
- Does not depend on support domain

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*Positive valued within support domain*

*Zero outside support domain*

4) Space Time Moving Least Squares method utilizes 1 point

- Taylor Series expansion to represent derivatives
- Maclaurin Series expansion to represent derivatives

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*Taylor Series expansion to represent derivatives*

Feedback for week 5

Assignment 5 Solution

Week 6

Week 7

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Week 12

5) Space time polynomial basis for two-dimensional in space and one-dimensional in time contains

1 point

- 11  
 9  
 8  
 10

No, the answer is incorrect.

Score: 0

Accepted Answers:

10

6) In weight function calculation for Space time Moving Least Squares method, norm correction is performed to

1 point

- Neutralize the effect of order difference between spatial variables  
 Neutralize the effect of order difference between spatial and temporal variables

No, the answer is incorrect.

Score: 0

Accepted Answers:

Neutralize the effect of order difference between spatial and temporal variables

7) In Scilab, execute  $\det(\mathbf{A})$  [determinant] for  $\mathbf{A} = \begin{pmatrix} 1 & 2 & -3 & 4 & 5 \\ 0 & 3 & -5 & -7 & 9 \\ 5 & -4 & 3 & -2 & 1 \\ 1 & 4 & -7 & -10 & 13 \\ -15 & 13 & 11 & -9 & 2 \end{pmatrix}$ .

1 point

The determinant value is

- 3994  
 3394  
 3944

No, the answer is incorrect.

Score: 0

Accepted Answers:

3944

8) In Scilab, execute  $\text{inv}(\mathbf{A})$  [inverse] for  $\mathbf{A} = \begin{pmatrix} 1 & 2 & -3 & 4 & 5 \\ 0 & 3 & -5 & -7 & 9 \\ 5 & -4 & 3 & -2 & 1 \\ 1 & 4 & -7 & -10 & 13 \\ -15 & 13 & 11 & -9 & 2 \end{pmatrix}$ .

1 point

The value of (3, 3) term of the inverse matrix is

- 0.1340241  
 0.1340241  
 0.2866184  
 0.1389452

No, the answer is incorrect.

Score: 0

Accepted Answers:

0.1389452

9) In Scilab, use `gausselim.sci` to solve the following problem

1 point

$$\begin{pmatrix} 1 & 2 & -3 & 4 & 5 \\ 0 & 3 & -5 & -7 & 9 \\ 5 & 1 & 3 & -2 & 1 \\ 1 & 4 & -7 & 1 & 13 \\ 10 & 13 & 11 & -9 & 2 \end{pmatrix} \begin{pmatrix} \phi_1 \\ \phi_2 \\ \phi_3 \\ \phi_4 \\ \phi_5 \end{pmatrix} = \begin{pmatrix} 37 \\ 8 \\ 13 \\ 57 \\ 43 \end{pmatrix}$$

The value of  $\phi_3$  term is

- 1  
 2  
 3  
 4  
 5

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

3

10)

In Scilab, use  $\phi = \mathbf{A} \setminus \mathbf{r}$  to solve the following problem  $\mathbf{A} = \begin{pmatrix} 1 & 2 & -3 & 4 & 5 \\ 0 & 3 & -5 & -7 & 9 \\ 5 & 1 & 3 & -2 & 1 \\ 1 & 4 & -7 & 1 & 13 \\ 10 & 13 & 11 & -9 & 2 \end{pmatrix}$  and **1 point**

$$\mathbf{r} = \begin{pmatrix} 37 \\ 8 \\ 13 \\ 57 \\ 43 \end{pmatrix}$$

The value of  $\phi_2$  term is

- 1  
 2  
 3  
 4  
 5

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

2

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