Question # 1

1 point possible (ungraded)

Given two points (p, r) and (q, s), the Lagrange polynomial $p(x)$ that passes through the points will be

- ◯ $p(x) = \left(\frac{q-x}{q-s}\right) r + \left(\frac{x-r}{q-p}\right) s$
- ◯ $p(x) = \left(\frac{x-q}{q-s}\right) r + \left(\frac{x-p}{q-p}\right) s$
- ◉ $p(x) = \left(\frac{x-q}{p-q}\right) r + \left(\frac{x-p}{q-p}\right) s$
- ◯ None of the above

Question # 2

1 point possible (ungraded)

What is the advantage of Newton's divided/difference method over Lagrange method?

- ◯ In lagrange we need to determine determinant of matrix
- ◉ Easier to incorporate new node into computation of Polynomial
- ◯ Both of the above
- ◯ None of the above

Question # 3

1 point possible (ungraded)

If we are given 10 nodes, what should be the degree of the polynomial that is used to find the value of the coefficients using Lagrange method?

- ◉ 9
- ◯ 11
- ◯ 10
- ◯ None of the above

Question # 4

1 point possible (ungraded)

Which of the following statements is true?

- ( ) Suppose you are given n nodes, the polynomial will be of degree $n+1$.
- (x) An n degree polynomial has $(n+1)$ coefficients.
- ( ) We cannot add a new node easily after computation in Newton's method.
- ( ) None of the above.

Question # 5

1 point possible (ungraded)

Suppose a lagrange polynomial $p(x)$ passes through the points $(2, 1/8)$, $(3, 1/18)$ and $(4, 1/32)$. Determine $l_0(x)$.

- ( ) $\frac{1}{2}(x-2)(x-3)$.
- ( ) $-(x-2)(x-4)$.
- (x) $\frac{1}{2}(x-3)(x-4)$.
- ( ) None of the above.

Question # 6

1 point possible (ungraded)

Suppose a lagrange polynomial $p(x)$ passes through the points $(2, 4)$ and $(3, 5)$. Determine $p(2.5)$.

- ( ) 6.0
- ( ) 4.0
- (x) 4.5
- ( ) 5.0

Question # 7

1 point possible (ungraded)

Consider the function, $f(x)$ and the nodes $(2,3,4)$. What is the correct expression for error for this polynomial in terms of ξ?

- ( ) $\frac{f^{(4)}(\xi)}{4!}(x-2)(x-3)(x-4)$
- ( ) $\frac{f^{(2)}(\xi)}{2!}(x-2)(x-3)(x-4)$
- (•) $\frac{f^{(3)}(\xi)}{3!}(x-2)(x-3)(x-4)$
- ( ) None of the above

Question # 8

1 point possible (ungraded)

Suppose you have to find the interpolating polynomial using Newton's Divided/Difference method for the function, $f(x)$, and passes through the points $(-1,5)$, $(0,1)$ and $(1,1)$. What is the value of $f[x_0, x_1]$?

- ( ) $5.$
- (•) $-4.$
- ( ) $2.$
- ( ) $-3.$

Question # 9

1 point possible (ungraded)

Suppose you are using Newton's Divided/Difference method to find interpolating polynomial. If $f(x) = 1/x$ then $f[x_0, x_1]$ is

- ( ) $-\frac{1}{{x_0}^2{x_1}^2}$
- (•) $-\frac{1}{x_0 x_1}$
- ( ) $\frac{1}{{x_0}^2{x_1}^2}$
- ( ) $\frac{1}{x_0 x_1}$

Question # 10

1 point possible (ungraded)

Which of the following is the degree of the Hermite Interpolation polynomial for $n+1$ nodes?

- (•) $2n+1$
- ( ) $2n+2$
- ( ) $n+1$
- ( ) None of the above

Question # 11

1 point possible (ungraded)

How can we avoid the occurrence of Runge phenomenon?

- (•) More nodes at the ends of the interval.
- ( ) More nodes at the middle of the interval.
- ( ) Increase the number of nodes.
- ( ) None of the above.

Question # 12

1 point possible (ungraded)

What is the correct expression for taking equal angular points (θ) in the case of the Runge function?

- ( ) $\frac{(2j)\pi}{2(n+1)}$
- (•) $\frac{(2j+1)\pi}{2(n+1)}$
- ( ) $\frac{(2j+2)\pi}{2(n+2)}$
- ( ) None of the above

Question # 13

1 point possible (ungraded)

Which of the following statement is false?

- (•) For the runge function, most efficient choice is equally spaced nodes.
- ( ) For the runge function, most efficient choice is Chebyshev nodes.
- ( ) Both of the above.
- ( ) None of the above.

Question # 14

1 point possible (ungraded)

Suppose you have a function and 3 nodes. What will be the degree of Hermite Interpolation polynomial passing through these nodes?

- ( ) 2
- ( ) 4
- ( ) 3
- (•) None of the above

Question # 15

1 point possible (ungraded)

A function $f(x)$ has values $0,\ 1,\ 0$ at the nodes $-1,\ 0,\ 1$ respectively. The first derivative values are $1,\ 0,\ 1$ respectively. What will be the expression of $l_1(x)$?

- ◯ $\frac{1}{2}x^2 + \frac{1}{2}x$
- ◯ $\frac{1}{2}x^2 - \frac{1}{2}x$
- ◉ $1 - x^2$
- ◯ None of the above

Question # 16

1 point possible (ungraded)

A function $f(x)$ has values $0,\ 1,\ 0$ at the nodes $-1,\ 0,\ 1$ respectively. The first derivative values are $1,\ 0,\ 1$ respectively. What will be the expression of $l_0(x)$?

- ◯ $\frac{1}{2}x^2 + \frac{1}{2}x$
- ◉ $\frac{1}{2}x^2 - \frac{1}{2}x$
- ◯ $1 - x^2$
- ◯ None of the above

Question # 17

1 point possible (ungraded)

The bases of the Hermite Polynomial are

- ◯ $h'_k(x), \widehat{h}_k(x)$
- ◯ $l_k(x), \widehat{l}_k(x)$
- ◉ $h_k(x), \widehat{h}_k(x)$
- ◯ None of the above