



NH - 67, Karur - Trichy Highways, Puliur C.F, 639 114 Karur District

MA8491-NUMERICAL METHODS

UNIT-III- Numerical Differentiation and Integration

1. The below mentioned formula is suitable to find out

$$\int_{x_0}^{x_n} y dx = nh[y_0 + \frac{n}{2}\Delta y_0 + \frac{n(2n-3)}{12}\Delta^2 y_0 + \frac{n(n-2)^2}{24}\Delta^3 y_0 + \dots]$$

- A. Simpson's 1/3 rule
- B. Simpson's 3/8 rule
- C. Trapezoidal rule
- D. **Newton Cote's formula**

Answer: (D)

2. The below mentioned formula is suitable to find out

$$\int_{x_0}^{x_n} y dx = \frac{h}{2} [(y_0 + y_n) + 2(y_1 + y_2 + y_3 + \dots + y_{n-1})]$$

- A. Simpson's 1/3 rule
- B. Simpson's 3/8 rule
- C. **Trapezoidal rule**
- D. Newton Cote's formula

Answer: (C)

3. The below mentioned formula is suitable to find out

$$\int_{x_0}^{x_n} y dx = \frac{h}{3} [(y_0 + y_n) + 4(y_1 + y_3 + y_5 + \dots) + 2(y_2 + y_4 + y_6 + \dots)]$$
 is the formula of

- A. **Simpson's 1/3 rule**
- B. Simpson's 3/8 rule
- C. Trapezoidal rule
- D. Newton Cote's formula

Answer: (A)

4. The below mentioned formula is suitable to find out

$$\int_{x_0}^{x_n} y dx = \frac{3h}{8} [(y_0 + y_n) + 3(y_1 + y_2 + y_4 + y_5 + \dots) + 2(y_3 + y_6 + y_9 + \dots)]$$

- A. Simpson's 1/3 rule
- B. Simpson's 3/8 rule**
- C. Trapezoidal rule
- D. Newton Cote's formula

Answer: (B)

5. Which formula is called closed formula?

- A. Simpson's rule**
- B. Trapezoidal

Answer: (A)

6. What is the condition to apply Simpson's $\frac{1}{3}$ rule for integration?

- A. The interval of integration must be divided into an even number of sub-intervals.**
- B. The interval of integration must be divided into an odd number of sub-intervals.
- C. The interval of integration must be divided into 3 sub-intervals
- D. The interval of integration must be divided into 6 sub-intervals

Answer: (A)

7. In Simpson's $\frac{3}{8}$ rule for integration the interval of integration must be divided into how many sub intervals?

- A. 2
- B. 3**
- C. 4
- D. 5

Answer: (B)

8. In Simpson's 3/8 rule the interval of integration is divided into

- A. The interval of integration must be divided into an even number of sub-intervals.
- B. The interval of integration must be divided into an odd number of sub-intervals.
- C. The interval of integration must be divided into multiple of 3 sub-intervals**
- D. The interval of integration must be divided into 10 sub-intervals

Answer: (C)

9. What is the order of error in Trapezoidal rule?

- A. h^2**
- B. h^3
- C. h^4
- D. h^5

Answer: (A)

10. What is the order of error in Simpson's $\frac{1}{3}$ rule (or) Simpson's rule?

- A. h^2
- B. h^3
- C. h^4
- D. h^5

Answer: (C)

11. What is the order of error in Simpson's $\frac{3}{8}$ rule?

- A. h^2
- B. h^3
- C. h^4
- D. h^5

Answer: (D)

12. What is the error in Trapezoidal rule?

- A. $E = \frac{(b-a)}{12} h^2 y''(x)$
- B. $E = -\frac{(b-a)}{14} h^2 y''(x)$
- C. $E = -\frac{(a-b)}{12} h^2 y''(x)$
- D. $E = -\frac{(b-a)}{12} h^2 y''(x)$

Answer: (D)

13. What is the error in Simpson's $\frac{1}{3}$ rule (or) Simpson's rule?

- A. $E = \frac{(b-a)}{180} h^4 y^{iv}(x)$
- B. $E = -\frac{(a-b)}{150} h^4 y^{iv}(x)$
- C. $E = -\frac{(b-a)}{180} h^4 y^{iv}(x)$
- D. $E = \frac{(b-a)}{150} h^4 y^{iv}(x)$

Answer: (C)

14. What is the error in Simpson's $\frac{3}{8}$ rule?

A. $E = -\frac{3(b-a)}{80} h^5 y^{iv}(x)$

B. $E = \frac{3(b-a)}{80} h^5 y^{iv}(x)$

C. $E = -\frac{3(b-a)}{50} h^5 y^{iv}(x)$

D. $E = -\frac{3(b-a)}{50} h^4 y^{iv}(x)$

Answer: (A)

15. If $I_1 = 0.775$ and $I_2 = 0.7430$ with $h = 0.5$ and $h = 0.25$, find I using Romberg's method.

A. **0.7802**

B. 0.7602

C. 0.7805

D. 0.7702

Answer: (A)

16. Gaussian 2-point quadrature formula for integration is

A. $\int_{-1}^1 f(t) dt = f\left(-\frac{1}{\sqrt{3}}\right) + f\left(\frac{1}{\sqrt{3}}\right)$

B. $\int_{-1}^1 f(t) dt = f\left(-\frac{1}{\sqrt{5}}\right) + f\left(\frac{1}{\sqrt{5}}\right)$

C. $\int_{-1}^1 f(t) dt = f\left(-\frac{1}{\sqrt{3}}\right) + f\left(\frac{1}{\sqrt{5}}\right)$

D. $\int_{-1}^1 f(t) dt = f\left(-\frac{1}{\sqrt{5}}\right) + f\left(\frac{1}{\sqrt{3}}\right)$

Answer: (A)

17. Trapezoidal formula is also known as _____

A. Simpson's rule

B. Co-ordinate method

C. Prismoidal method

D. Average end area method

Answer: (D)

18. The value obtained from Simpson's rule depends on the nature of the curve.

A. True

B. False

Answer: (A)

19. In which of the following cases, Simpson's rule is adopted?

- A. When straights are perpendicular
- B. When straights are parallel**
- C. When straights form curves
- D. When straights form parabolic arcs

Answer: (B)

20. Which of the following shapes is generally preferred in case of application of Simpson's rule?

- A. Square
- B. Triangle
- C. Trapezoid**
- D. Rectangle

Answer: (C)

21 Which of the following can the Simpson's rule possess?

- A. Negatives
- B. Accuracy**
- C. Positives
- D. Zero error

Answer: (B)

22. Simpsons rule will give exact result, if the entire curve $y=f(x)$ is a

- A. hyperbola
- B. parabola**
- C. ellipse
- D. cone

Answer: (B)

23. By Gaussian two point formula $\int_{-1}^1 (3x^2 + 5x^4) dx =$

- A. 3.311
- B. 3.211
- C. 3.112**
- D. 3.213

Answer: (C)

24. If the range is not $(-1,1)$, then what is the idea to solve the Gaussian quadrature problem.

A. $x = \frac{b-a}{2}z + \frac{b+a}{2}$

B. $x = \frac{b+a}{2}z + \frac{b-a}{2}$

C. $x = \frac{b+a}{2} + \frac{b-a}{2}$

D. $x = \frac{b+a}{2}z - \frac{b-a}{2}$

Answer: (A)

25. In Romberg's method which formula is used

A. Simpson's 1/3 rule

B. Simpson's 3/8 rule

C. **Trapezoidal rule**

D. Newton Cote's formula

Answer: (C)