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MA8491-NUMERICAL METHODS

UNIT-III- Numerical Differentiation and Integration

1. The below mentioned formula is suitable to find out

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

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

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

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

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

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

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

Answer: (D)

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

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

Answer: (C)

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

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

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

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

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

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)