① Mathematics

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B.Sc. T.Y Semester-VI
paper XV
Numerical Analysis

Unit-I

① The value of independent variable in $y = f(x)$ is called ______.

a) Argument b) Entry c) Interval d) Jump.

② The value of dependent variable in $y=f(x)$ is called ______

a) Argument ~~b) Entry~~ c) Interval d) Jump

③ The difference between the consecutive values of the independent variable is called ______
a) Argument b) Entry
c) Interval of differences d) none of these.

④ The n^{th} difference of a rational integral function (polynomial) of the n^{th} degree are constant when the values of the independent variable are at ______

a) Equal intervals b) Un-equal intervals
c) both a) & b) d) Any interval.

⑤ The value of $\Delta^3 (1-x)(1-2x)(1-3x)$ is
a) -36 b) 36 c) 6 d) -6

⑥ The value of $\Delta^n (e^{ax+b})$ is
a) $e^{ax+b}(e^a-1)^n$ b) $e^{ax+b}(e^a-1)$ c) $e^{ax+b}(e^a-1)^2$ d) none of these

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(7) $\Delta^m x^{(r)} =$ ______

a) $r(r-1) \cdots [r-m] \cdot h^m x^{(r)}$; $m \le r$

b) $r(r-1) \cdots [r-(m-1)] \cdot h^{m-1} x^{(r-m)}$; $m \le r$

c) $r(r-1) \cdots [r-(m-1)] \cdot h^m x^{(r-m)}$; $m \le r$

d) none of these.

(8) If x is an integer greater than $(n-1)$ then

a) $x^{(n)} = \frac{x!}{(x-n)!}$ b). $x^{(n)} = \frac{x!}{(x-n+1)!}$

c) $x^{(n)} = \frac{x!}{(x-n-1)!}$ d) none of these.

(9) $\Delta^m x^{(-r)} =$ ______

a) $(-1)^m r(r+1) \cdots (r+m-1) h^m \cdot x^{(-r-m)}$; $m \le r$

b) $(-1)^{m+1} r(r+1) \cdots (r+m-1) h^m \cdot x^{(-r-m)}$; $m \le r$

c) $r(r+1) \cdots (r+m-1) h^m \cdot x^{(-r-m)}$; $m \le r$

d) $(-1)^{m-1} r(r+1) \cdots (r+m-1) h^m \cdot x^{(-r-m)}$; $m \le r$

(10) The operators Δ & E follows or obeys ~~the~~

a) distributive law b) Commutative law

c) index laws d) All of these.

(11) The operator E is called ______

a) Displacement operator

b) Difference operator

c) Backward operator

d) none of these.

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(12) The difference operator Δ is given by ________.

a) $\Delta f(a) = f(a+h) - f(a)$
b) $\Delta f(a) = f(a) - f(a+h)$
c) $\Delta f(a) = f(a+h) + f(a)$
d) none of these.

(13) The displacement operator E is given by

a) $Ef(a) = f(a-h)$
b) $Ef(a) = f(a)$
c) $Ef(a) = f(h)$
d) $Ef(a) = f(a+h)$

(14) Relation between Δ & E is given by

a) $E \equiv 1+\Delta$ b) $E \equiv 1-\Delta$
c) $E \equiv \Delta$ d) none of these

(15) The inverse operator E^{-1} is given by

a) $E^{-1}f(x) = f(x+h)$ b) $E^{-1}f(x) = f(x)$
c) $E^{-1}f(x) = f(x-h)$ d) none of these.

(16) The formula

$$P_n(x) = f(a) + \frac{\Delta f(a)}{h}(x-a) + \frac{\Delta^2 f(a)}{2!\,h^2}(x-a)(x-a-h) + \frac{\Delta^3 f(a)}{3!\cdot h^3}(x-a)(x-a-h)(x-a-2h) + \cdots + \frac{\Delta^n f(a)}{n!\cdot h^n}(x-a)(x-a-h)\cdots(x-a-(n-1)h)$$

is called ________

a) Newton – Gregory formula for forward Interpolation.
b) Newton – Gregory formula for backward Interpolation.
c) Newton's formula for divided diff.
d) none of these.

(17) The formula

$$P_n(x) = f(a+nh) + \frac{\nabla f(a+nh)}{h}(x-\overline{a+nh}) + \frac{\nabla^2 f(a+nh)}{2!\,h^2}(x-\overline{a+nh})(x-\overline{a+nh-h}) + \dots + \frac{\nabla^n f(a+nh)}{n!\,h^n}(x-\overline{a+nh})(x-\overline{a+nh-h}) \dots (x-\overline{a+h})$$

is called ________

a) Newton – Gregory formula for forward Interpolation.
b) Newton – Gregory formula for Backward Interpolation.
c) Newton' formula for divided diff
d) none of these

(18) The divided difference are symmetrical in all their ________

a) Arguments b) Entries
c) both a) & b) d) none of these.

(19) The value of any divided difference is independent of the order of the ________.

a) Arguments b) Entries

(20) The n^{th} divided difference of a polynomial of the n^{th} degree are

a) of degree $(n-1)$ b) of degree $(n-2)$
✓c) Constant d) of degree n

(21) $f(x_0, x_1)$ is given by

✓a) $\frac{f(x_0) - f(x_1)}{x_0 - x_1}$ b) $\frac{f(x_1) - f(x_0)}{x_0 - x_1}$
c) $\frac{f(x_0) - f(x_1)}{x_0}$ d) $\frac{f(x_0) - f(x_1)}{x_1}$

(22) $f(x_0, x_1, x_2)$ is given by

✓a) $\frac{f(x_0, x_1) - f(x_1, x_2)}{x_0 - x_2}$ b) $\frac{f(x_0, x_1) - f(x_1, x_2)}{x_0 - x_1}$
c) $\frac{f(x_1, x_2) - f(x_0, x_1)}{x_0 - x_2}$ d) $\frac{f(x_1, x_2) - f(x_0, x_1)}{x_0 - x_1}$

(23) $f(\underbrace{x_0, x_0, \ldots, x_0}_{(r+1)\text{ times}}) = ?$

a) $\frac{1}{(r+1)!} f^{r}(x_0)$ ✓b) $\frac{1}{r!} f^{r}(x_0)$

c) $\frac{1}{r!} f^{r+1}(x_0)$ d) $\frac{1}{(r+1)!} f^{(r+1)}(x_1)$

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(24) $f(x_0, x_1) =$ ______

a) $f(x_1, x_0)$ b) $\dfrac{f(x_0) - f(x_1)}{x_0 - x_1}$

c) $\dfrac{f(x_1) - f(x_0)}{x_1 - x_0}$ d) All of these

(25) $f(x_0, x_1, x_2) =$ ______

a) $f(x_1, x_0, x_2)$ b) $f(x_2, x_1, x_0)$

c) both a) & b) d) none of these

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Unit-II

1. The n^{th} divided difference can be expressed as the quotient of two determinant, each of order ______.

a) n b) $n-1$ c) $n+1$ d) n^2

2. The ______ divided difference can be expressed as the product of multiple integrals i.e,

$$f(x_1, x_2, \dots, x_n) = \int_0^1 dt_1 \int_0^{t_1} dt_2 \int_0^{t_2} dt_3 \cdots \int_0^{t_{n-2}} f^{n-1}(u_n)\, dt_{n-1}$$

a) $(n-1)^{th}$ b) n^{th} c) $(n+1)^{th}$ d) $(n+2)^{th}$

3. The formula

$$f(x) = f(x_0) + (x-x_0) f(x_0, x_1) + (x-x_0)(x-x_1) f(x_0, x_1, x_2) + (x-x_0)(x-x_1) \dots (x-x_{n-1}) f(x_0, x_1, \dots, x_n)$$

is called ______.

a) Newton's - Gregory formula for forward Interpolation.
b) Newton - Gregory formula for Backward Interpolation.
c) Newton's divided difference Interpolation formula.
d) None of these.

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(4) Which of the following is correct?

a) $f(x_0, x_1, \cdots, x_n) = \frac{1}{(n!)} h^n \Delta^n f(x_0)$

b) $f(x_0, x_1, \cdots, x_n) = \frac{1}{(n+1)!} h^n \Delta^n f(x_0)$

c) $f(x_0, x_1, \cdots, x_n) = \frac{1}{n!} h^{n+1} \Delta^n f(x_0)$

d) none of these.

(5) n^{th} divided difference of x^n is ______.

a) 1 b) 0 c) 2 d) −1

(6) $\delta f(x) = ?$

a) $f(x + \frac{h}{2}) + f(x - \frac{h}{2})$

b) $f(x + \frac{h}{2}) - f(x - \frac{h}{2})$

c) $f(x + \frac{h}{2}) + f(\frac{h}{2} - 2x)$

d) none of these.

(7) $\delta E^{\frac{1}{2}} f(x) =$ ______

a) $\Delta f(x)$ b) $\nabla f(x)$ c) $E f(x)$ d) $f(x+h)$

(8) Which of the following is true?

a) $\delta = \Delta E^{-\frac{1}{2}}$ b) $\delta = \nabla E^{\frac{1}{2}}$

c) both a) & b) d) none of a) & b)

⑧ The operator μ is called the ______.

a) Difference operator
b) Displacement operator
c) Averager
d) none of these.

⑨ which of the following is true for operators δ & σ ?

a) $\delta\sigma = \sigma\delta$ b) $\delta\sigma \neq \sigma\delta$
c) $\delta^{-1} \neq \sigma$ d) none of these.

⑩ Which of the following is true for operators δ & σ ?

a) $\delta\sigma = \sigma\delta$ b) $\delta = \sigma$
c) $\delta^{-1} \neq \sigma$ d) $\delta^{-1} = \sigma$

⑪ The formula

$$y_u = y_0 + {}^{u}C_1 \Delta y_0 + {}^{u}C_2 \Delta^2 y_{-1} + {}^{u+1}C_3 \Delta^3 y_{-1} + \cdots + {}^{u+1}C_4 \Delta^4 y_{-2} + \cdots + {}^{u+k-1}C_{2k-1} \Delta^{2k-1} y_{-k+1} + {}^{u+k-1}C_{2k} \Delta^{2k} y_{-k} + \cdots$$

is called ______

a) Guass's forward formula for equal Intervals.
b) Gauss's backward formula for equal intervals.

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c) Bessel's Interpolation formula
d) none of these.

(12) which of the following is true?

a) $\sigma = \frac{E}{E-1}$ b) $\sigma = \frac{E^{1/2}}{E - E^{1/2}}$

c) $\sigma = \frac{E}{E+1}$ d) $\sigma = \frac{E^{1/2}}{E+1}$

(13) The formula

$$y_u = y_0 + u\mu\delta y_0 + \frac{u^2}{2!}\delta^2 y_0 + {}^{u+1}C_3\,\mu\delta^3 y_0$$
$$+ \frac{u^2(u^2-1)^2}{4!}\delta^4 y_0 + {}^{u+2}C_5\,\mu\delta^5 y_0$$
$$+ \frac{u^2(u^2-1)^2(u^2-2)^2}{6!}\delta^6 y_0$$

is called __________.

a) Guass Interpolation formula.
b) Stirling's interpolation formula.
c) Bessel's interpolation formula.
d) none of these.

(14) Guass's forward formula for equal Intervals employs odd differences just ________ the central line through.

a) Above b) below c) on the line d) ~~nowhere~~ Anywhere

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(15) Guass's backward formula for equal Intervals employs the odd differences just ______ the Central line through

a) Above b) below c) on the line d) ~~nowhere~~ Anywhere

(16) stirling's formula employs the mean of the odd differences ______ the Central line.

a) above b) below ✓c) both a) & b) d) on the line

(17) Guass's forward formula for equal intervals employs even differences ______ central line.

✓a) on the b) above c) below d) both a) & b).

(18) Guass's backward formula for equal intervals employs even differences ______ central line.

✓a) on the b) Above c) below. d) both a) & b).

(19) stirling's formula employs even differences ______ the central line.

✓a) on b) Above c) Below d) both a) & b).

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20. In Bessel's Interpolation formula the co-efficient of odd order difference are all zero at

a) $u = \frac{1}{2}$ b) $u = 0$ c) $u = 1$ d) All of these ✓

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Unit - III

1. When we have to find the derivative of the function at a point near the beginning (end) of a set of tabular values we use ______.

a) Newton Gregory forward (backward) formula
b) Central difference formula
c) Newton's divided difference formula
d) None of these.

2. When we have to find the derivative of a function near the middle of the table, ~~we~~ we use ______.

a) One of Central difference formula
b) Divided difference formula
c) Newton - Gregory formula
d) None of these.

3. $y_i' = ?$

a) $\frac{1}{2h}(y_{i+1} - y_i)$ b) $\frac{1}{2h}(y_{i+1} + y_{i-1})$

c) $\frac{1}{2h}(y_{i+1} - y_{i-1})$ d) None of these.

4. $y_i'' = ?$

a) $\frac{1}{h^2}(y_{i+1} + 2y_i + y_{i-1})$ b) $\frac{1}{h^2}(y_{i+1} - 2y_i + y_{i-1})$

c) $\frac{1}{h^2}(y_{i+1} + 2y_i - y_{i-1})$ d) None of these

5) $y_i''' = ?$

a) $\frac{1}{2h^3}(y_{i+2} - 2y_{i+1} + 2y_{i-1} - y_{i-2})$

b) $\frac{1}{2h^3}(y_{i+2} + 2y_{i+1} + 2y_{i-1} + y_{i-2})$

c) $\frac{1}{2h^3}(y_{i+2} + 2y_{i+1} - 2y_{i-1} - y_{i-2})$

d) $\frac{1}{2h^3}(y_{i+2} - 2y_{i+1} - 2y_{i-1} + y_{i-2})$

6) $y_i^{iv} = ?$

a) $\frac{1}{h^4}(y_{i+2} + 4y_{i+1} + 6y_i - 4y_{i-1} + y_{i-2})$

b) $\frac{1}{h^4}(y_{i+2} - 4y_{i+1} + 6y_i - 4y_{i-1} + y_{i-2})$

c) $\frac{1}{h^4}(y_{i+2} + 4y_{i+1} + 6y_i + 4y_{i-1} + y_{i-2})$

d) $\frac{1}{h^4}(y_{i+2} - 4y_{i+1} - 6y_i + 4y_{i-1} + y_{i-2})$

7) Unsymmetrical Expression for the third derivative is

a) $y_i''' = \frac{1}{h^3}(y_{i+2} - 3y_{i+1} + 3y_i - y_{i-1})$

b) $y_i''' = \frac{1}{h^3}(y_{i+2} - 3y_{i+1} - 3y_i - y_{i-1})$

c) $y_i''' = \frac{1}{h^3}(y_{i+2} + 3y_{i+1} + 3y_i + y_{i-1})$

d) none of these.

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(8) The process of finding or evaluating the value of the integrand is called ________.

a) Numerical Derivative.
b) Numerical Quadrature ✓
c) both a) & b)
d) none of these.

(9) If $y = f(x)$ is given for certain equidistant values of x ~~say~~ then

$$\int_a^b y\,dx = \text{\_\_\_\_\_\_\_\_}$$

✓ a) $h\left[ny_0 + \frac{n^2}{2}\Delta y_0 + \left(\frac{n^3}{3} - \frac{n^2}{2}\right)\frac{\Delta^2 y_0}{2!} + \left(\frac{n^4}{4} - n^3 + n^2\right)\frac{\Delta^3 y_0}{3!} + \cdots \text{upto } (n+1) \text{ terms}\right]$

b) $h\left[ny_0 + \frac{n}{2}\Delta y_0 + \left(\frac{n2}{2} - \frac{n}{2}\right)\Delta^2 y_0 + \left(\frac{n^3}{3} - n^2 + n\right)\frac{\Delta^3 y_0}{3!} + \cdots + \text{upto} (n+1) \text{ terms}\right]$

c) $h\left[ny_0 + \frac{n^2}{2}\Delta y_0 + \left(\frac{n^3}{3} + \frac{n^2}{2}\right)\frac{\Delta^2 y_0}{2!} + \left(\frac{n^4}{4} + n^3 + n^2\right)\frac{\Delta^3 y_0}{3!} + \cdots + \text{upto} (n+1) \text{ terms}\right]$

d) None of these

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(10) The formula

$$I = \int_a^b y\,dx = h\left[n y_0 + \frac{n^2}{2}\Delta y_0 + \left(\frac{n^3}{3} - \frac{n^2}{2}\right)\frac{\Delta^2 y_0}{2!} + \left(\frac{n^4}{4} - n^3 + n^2\right)\frac{\Delta^3 y_0}{3!} + \dots + \text{upto } (n+1) \text{ terms}\right]$$

is called ________

a) Trapezoidal Rule b) Simpson's one third Rule
c) Simpson's three eighths rule
✓ d) General Quadrature formula

(11) The formula

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

is called ________

✓ a) Trapezoidal Rule
b) Simpson's one third Rule
c) Simpson's one eighth rule
d) general quadrature formula

(12) The formula

$\int_{x_0}^{x_0+nh} y\,dx$ = Distance between two consecutive ordinates × [mean of the first and the last ordinate + sum of all the intermediate ordinates]

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a) Simpson's one third Rule
b) Simpson's three eighths Rule
c) Trapezoidal Rule
d) None of these

13. The formula

$$\int_{x_0}^{x_0+nh} y\,dx = \frac{h}{3}\left[(y_0+y_n)+4(y_1+y_3+\cdots+y_{n-1}) + 2(y_2+y_4+\cdots+y_{n-2})\right]$$

is called ________.

a) Simpson's one third rule
b) Simpson's three eighth rule.
c) Trapezoidal Rule
d) None of these.

14. The formula

$$\int_{x_0}^{x_0+nh} y\,dx = \frac{3h}{8}\left[(y_0+y_n)+3(y_1+y_2+y_5+\cdots+y_{n-1}) + 2(y_3+y_6+\cdots+y_{n-3})\right]$$

is known as ________.

a) Simpson's three eighth rule.
b) Simpson's one third rule.
c) Trapezoidal Rule
d) None of the above

(15) General quadrature formula is given by, if $y = f(x)$

a) $$\int_a^b y\,dx = h\left[ny_0 + \frac{n^2}{2}\Delta y_0 + \left(\frac{n^3}{3} - \frac{n^2}{2}\right)\frac{\Delta^2 y_0}{2!} + \left(\frac{n^4}{4} - n^3 + n^2\right)\frac{\Delta^3 y_0}{3!} + \cdots + \text{upto } (n+1) \text{ terms}\right]$$

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

c) $$\int_{x_0}^{x_0+nh} y\,dx = \frac{h}{3}\left[(y_0 + y_n) + 4(y_1 + y_3 + \cdots + y_{n-1}) + 2(y_2 + y_4 + \cdots + y_{n-2})\right]$$

d) None of these.

(16) Trapezoidal Rule is given by

a) $$\int_a^b y\,dx = h\left[ny_0 + \frac{n^2}{2}\Delta y_0 + \left(\frac{n^3}{3} - \frac{n^2}{2}\right)\frac{\Delta^2 y_0}{2!} + \left(\frac{n^4}{4} - n^3 + n^2\right)\frac{\Delta^3 y_0}{3!} + \cdots + \text{upto } (n+1) \text{ term}\right]$$

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

c) $$\int_{x_0}^{x_0+nh} y\,dx = \frac{h}{3}\left[(y_0 + y_n) + 4(y_1 + y_3 + \cdots + y_{n-1}) + 2(y_2 + y_4 + \cdots + y_{n-2})\right]$$

d) None of these.

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(17) Simpson's one third is given by

a) $\int_a^b y\,dx = h\left[ny_0 + \frac{n^2}{2}\Delta y_0 + \left(\frac{n^3}{3} - \frac{n^2}{2}\right)\frac{\Delta^2 y_0}{2!} + \left(\frac{n^4}{4} - n^3 + n^2\right)\frac{\Delta^3 y_0}{3!} + \cdots + \text{upto } (n+1) \text{ terms}\right]$

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

c) $\int_{x_0}^{x_0+nh} y\,dx = \frac{h}{3}\left[(y_0 + y_n) + 4(y_1 + y_3 + \cdots + y_{n-1}) + 2(y_2 + y_4 + \cdots + y_{n-2})\right]$

d) None of these.

(18) Simpson's three eighth rule is given by __________

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

b) $\int_{x_0}^{x_0+nh} y\,dx = \frac{h}{3}\left[(y_0 + y_n) + 4(y_1 + y_3 + \cdots + y_{n-1}) + 2(y_2 + y_4 + \cdots + y_{n-2})\right]$

c) $\int_{x_0}^{x_0+nh} y\,dx = \frac{3h}{8}\left[(y_0 + y_n) + 3(y_1 + y_2 + y_4 + y_5 + \cdots + y_{n-1}) + 2(y_3 + y_6 + \cdots + y_{n-3})\right]$

d) None of these.

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(19) Weddle's Rule is given by ______

a) $\int_{x_0}^{x_0+nh} y\,dx = \frac{3h}{10}[y_0 + 5y_1 + y_2 + 6y_3 + y_4 + 5y_5 + 2y_6 + 5y_7 + y_8 + \cdots]$

b) $\int_{x_0}^{x_0+nh} y\,dx = \frac{h}{3}[(y_0 + y_n) + 4(y_1 + y_3 + \cdots + y_{n-1}) + 2(y_2 + y_4 + \cdots + y_{n-2})]$

c) $\int_{x_0}^{x_0+nh} y\,dx = \frac{3h}{8}[(y_0 + y_n) + 3(y_1 + y_2 + y_5 + \cdots + y_{n-1}) + 2(y_3 + y_6 + \cdots + y_{n-3})]$

d) None of these.

(20) The formula

$$\int_{x_0}^{x_0+nh} y\,dx = \frac{3h}{10}[y_0 + 5y_1 + y_2 + 6y_3 + y_4 + 5y_5 + 2y_6 + 5y_7 + y_8 + \cdots]$$

is called ______

a) Simpson's One third Rule
b) Simpson's Three Eighths Rule
c) Weddle's Rule
d) None of these.

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(21) Which of the following Rule requires at least seven consecutive values of the function?

a) Simpson's One third rule
b) Simpson's three eighths rule.
c) Weddle's rule
d) None of these.

(22) If $\frac{dy}{dx} = f(x,y)$ then Euler's Method is given by

a) $y_{n+1} = y_n + h\, f(x_n, y_n)$
b) $y_n = y_{n+1} + h\, f(x_n, y_n)$
c) $y_{n+1} = y_n - h\, f(x_n, y_n)$
d) None of the above

(23) In Euler's Method if h is large then this method is ________

a) More accurate
b) less accurate
c) inaccurate
d) exactly Correct

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(24) If $\frac{dy}{dx} = f(x, y)$ then

$$y_{i+1} = y_i + \frac{1}{2}h\left[f(x_i, y_i) + f(x_{i+1}, y_{i+1})\right] + R$$

where R is an error.

then this formula is called ______

a) Euler's Method
b) Euler's Modified Method.
c) both a) & b)
d) None of a) & b)

(25) By picard's Method of Successive Approximations second approximations is given by where $u_1(x)$ is first approximation.

a) $u_2(x) = y_0 + \int_{x_0}^{x} f\{x, u_1(x)\}\,dx$

b) $u_2(x) = y_0 - \int_{x_0}^{x} f\{x, u_1(x)\}\,dx$

c) $u_2(x) = y_0 + \int_{x_0}^{x} f\{x, u_2(x)\}\,dx$

d) $u_2(x) = y_0 - \int_{x_0}^{x} f\{x, u_2(x)\}\,dx$

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(26) If $\frac{dy}{dx} = f(x,y)$ with boundary Conditions $y = y_0$ when $x = x_0$ then Taylor's series is given by ________

a) $y = y_0 + hy'_0 + \frac{1}{2!} h^2 y''_0 + \frac{1}{3!} h^3 y'''_0 + \cdots$

b) $y = y_0 - hy'_0 + \frac{1}{2!} h^2 y''_0 - \frac{1}{3!} h^3 y'''_0 + \cdots$

c) $y = y_0 + hy'_0 - \frac{1}{2!} h^2 y''_0 - \frac{1}{3!} h^3 y'''_0 + \cdots$

d) None of these.