Seat No.	

P.G. Entrance Examination, May - 2023

M.Sc. MATHEMATICS

Sub. Code : 58716

Day and Date : Monday, 08-05-2023 **Total Marks : 100**

Time : 1.00 p.m. to 2.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Each question carries 1 mark.**
3) **Answers should be marked in the given OMR answer sheet by darkening the appropriate option.**
4) **Follow the instructions given on OMR Sheet.**
5) **Rough work shall be done on the sheet provided at the end of question paper.**

1) Let G be a group. Consider the following statements :

   I) G is abelian

   II) Z (G) = G. Then

   A) Only (I) $\Rightarrow$ (II) B) Neither (I) $\Rightarrow$ (II) nor (II) $\Rightarrow$ (I)

   C) (I) $\Leftrightarrow$ (II) D) Only (II) $\Rightarrow$ (I)

2) Consider a group G = $\{1, -1, i, -i\}$ under usual multiplication. Which of the following statement is not correct?

   A) G is a cyclic group B) $G = < i >$

   C) $G = < -i >$ D) $G = < 1 >$

3) Let $G = S_3$. Which of the following statement is not correct?

   A) $G' = A_3$ is a cyclic group B) G is abelian

   C) A_3 is normal subgroup of G D) $\dfrac{G}{A_3}$ is abelian

4) Consider the following statements :

I) Field is an integral domain.

II) Integral domain is a field. Then

A) Both (I) and (II) are true
B) Both (I) and (II) are false
C) Only (I) is true
D) Only (II) is true

5) Let R be a ring of integers. Characteristic of R is _____ .

A) 0
B) p (a prime number)
C) 1
D) ∞

6) An element a in a ring R is called ______ if $a^n = 0$ for some integer n.

A) unit
B) invertible
C) idempotent
D) nilpotent

7) Let $f : Z \to Z$ defined by $f(x) = 0$ for all $x \in Z$, where Z is ring of integers. Consider the following statements :

I) f is a homomorphism

II) f is onto. Then

A) Both (I) and (II) are true
B) Both (I) and (II) are false
C) Only (I) is true
D) Only (II) is true

8) Let R be a ring. If $f(x)$, $g(x) \in R[x]$ be non-zero polynomials such that $f(x) + g(x) \neq 0$, then which of the following statement is true?

A) $\deg(f(x)+g(x)) \leq \min[\deg(f(x)),\deg(g(x))]$

B) $\deg(f(x)+g(x)) \leq \max[\deg(f(x)),\deg(g(x))]$

C) $\deg(f(x)+g(x)) > \max[\deg(f(x)),\deg(g(x))]$

D) $\deg(f(x)+g(x)) \leq 0$

9) Consider the ring R = {0, 1, 2, 3, 4, 5} modulo 6. If $f(x) = 1 + 2x^3$, $g(x) = 2 + x + 3x^2 \in Z_6[x]$ over Z_6, then $\deg\left(f(x) \cdot g(x)\right) =$ _______ .

A) 2 B) 3

C) 4 D) 5

10) Let R be a ring and I be an ideal of R. If I = {0}, then quotient ring $\frac{R}{I} \cong$ _____.

A) R B) {0}

C) $\frac{1}{R}$ D) Z_p

11) The inverse of a complex number $z = 2 + 3i$ is $z^{-1} =$ _______.

A) $\left(\frac{2}{13}, \frac{3}{13}\right)$ B) $\left(\frac{2}{13}, \frac{-3}{13}\right)$

C) $\left(\frac{-2}{13}, \frac{3}{13}\right)$ D) $\left(\frac{-2}{13}, \frac{-3}{13}\right)$

12) If $f(z) = x^3 + i\,(1 - y)^3$, then $f'(z)$ exists only at $z =$ _____ .

A) i B) $-i$

C) 0 D) $1 + i$

13) For which of the following function $f(z)$, $\overline{f}(z)$ is also analytic?

A) z B) e^z

C) $\sin z$ D) $2 + 3i$

14) If Log z denotes the principal value of log z, then relation between them is _________.

A) $\operatorname{Log} z = 2 \log z + 2n\,\pi i,\ n = 0, 1, -1, \ldots.$

B) $\log z = \operatorname{Log} z + 2n\,\pi i,\ n = 0, 1, -1, \ldots.$

C) $\operatorname{Log} z = 3 \log z + n\,\pi i,\ n = 0, 1, -1, \ldots.$

D) $\log z = \operatorname{Log} z + n\,\pi i,\ n = 0, 1, -1, \ldots.$

15) An arc $z = z(t)$, $a \leq t \leq b$ which does not cross itself except $z(a) = z(b)$ is called _______.

A) Jordan arc B) Jordan curve

C) Closed arc D) Simple arc

16) The series of complex numbers $\sum_{n=0}^{\infty}\left(\frac{1}{2}-i\frac{1}{2}\right)^n$ is _____ .

A) divergent

B) converges to $\dfrac{1}{\frac{1}{2}+i\frac{1}{2}}$

C) converges to $\dfrac{1}{\frac{1}{2}-i\frac{1}{2}}$

D) converges to $\dfrac{-1}{\frac{1}{2}+i\frac{1}{2}}$

17) The Laurent series expansion of $z^2\sin\left(\frac{1}{z^2}\right)$ in the domain $1 < |z| < \infty$ is ______.

A) $\sum_{n=0}^{\infty}\frac{(-1)^n}{z^{2n}}$

B) $\sum_{n=0}^{\infty}\frac{1}{z^{2n+1}}$

C) $\sum_{n=0}^{\infty}\frac{1}{z^{2n}}$

D) $\sum_{n=0}^{\infty}\frac{(-1)^{n+1}}{z^{2n+1}}$

18) If $f(z)=\dfrac{1-\cos z}{z^3}$ then $z = 0$ is ______ type of singularity of $f(z)$.

A) removable B) simple pole

C) pole of order 3 D) essential

19) The value of the integral $\int_C \frac{(z-2)dz}{z^2(z-3)}$ taken counter clockwise around the circle $|z|= 2$ is _____ .

A) $\frac{2\pi i}{9}$ B) $2\pi i$

C) $-\frac{2\pi i}{9}$ D) $\frac{2\pi i}{3}$

20) $\operatorname*{Res}_{z=i} \frac{z^2+4z}{z^2+1} =$ ________

A) $2+\frac{i}{2}$ B) $2-\frac{i}{2}$

C) $-2+\frac{i}{2}$ D) $-2i-\frac{1}{2}$

21) The set {(0, 0, 0, 0), (1, –1, 2, 3), (0, 0, 1, 4)} of vectors in $\mathbb{R}^4$ is ______ .

A) linearly dependent in $\mathbb{R}^4$ B) linearly independent in $\mathbb{R}^4$

C) a basis of $\mathbb{R}^4$ D) orthogonal subset in $\mathbb{R}^4$

22) Let I : $\mathbb{R}^3 \to \mathbb{R}^3$ be the identity transformation. Then Rank of I is ______ .

A) 0 B) 3

C) 1 D) 6

23) If T $(x, y, z) = (x-y, y-z, z-x)$, then ______ $\in$ Ker T.

A) (1, 2, 3) B) (3, 1, 2)

C) (2, 4, 6) D) (1, 1, 1)

24) Let V be a vector space of 4 × 4 symmetric matrices of real numbers over the field of real numbers. Then dim V = _____ .

A) 10 B) 8

C) 4 D) 16

25) Let P_2 be the inner product space of polynomials of degree at most 2 over the field of real numbers, where the inner product is defined as $\langle p,q\rangle = \int_{-1}^{1} p(x)q(x)dx$ for $p,q \in P_2$. If $p = x$ and $q = x^2$, then the inner product $\langle p,q\rangle$ = ________.

A) 0 B) $\frac{1}{2}$

C) $\frac{3}{2}$ D) 2

26) Consider the following statements :

Statement (i) The subset $A = \{(x,y,1) : x,y \in \mathbb{R}\}$ of $\mathbb{R}^3$ is a subspace of $\mathbb{R}^3$.

Statement (ii) The subset $B = \{(x,y,z) \in \mathbb{R}^3 : x+y+z=0\}$ is a subspace of $\mathbb{R}^3$. Then ______.

A) Only statement (ii) is true B) Both the statements are false

C) Only statement (i) is true D) Both the statements are true

27) Let $T(x, y, z) = (x + y, 2z - x)$ be a linear transformation from $\mathbb{R}^3$ into $\mathbb{R}^2$. If B and B′ are standard ordered basis for $\mathbb{R}^3$ and $\mathbb{R}^2$ respectively, then $[T]_{B,B'}$ = ________.

A) $\begin{bmatrix} 1 & -1 \\ 1 & 0 \\ 0 & 2 \end{bmatrix}$ B) $\begin{bmatrix} 1 & 1 & 0 \\ -1 & 0 & 2 \end{bmatrix}$

C) $\begin{bmatrix} 1 & 1 \\ -1 & 2 \\ 0 & 0 \end{bmatrix}$ D) $\begin{bmatrix} 1 & 1 & 0 \\ 2 & 0 & -1 \end{bmatrix}$

28) Let c be an eigen value of a linear operator T on V. Then the set $\{v \in V \mid T(v) = cv\}$ is called ______ of T.

A) eigen space B) null space

C) range D) kernel

29) The constant term in the characteristic polynomial of the matrix $\begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ is ______.

A) 1
B) 2
C) -1
D) 0

30) Inner product space over complex field is called ______ .

A) Unitary space
B) Euclidean space
C) Real space
D) None of these

31) The value of $\int_0^\infty \frac{\sin t}{t} dt =$ ______.

A) $\frac{\pi}{4}$
B) $\frac{\pi}{2}$
C) $\frac{\pi}{6}$
D) $\frac{\pi}{3}$

32) $L^{-1}\left\{\frac{k}{ks-1}\right\} =$ ______ $k > 0$

A) e^{2k}
B) $e^{\frac{s}{k}}$
C) e^{4k}
D) e

33) $L\left\{a^t\right\} =$ _______.

A) $\frac{1}{s - \log a}$
B) $\frac{1}{s - a}$
C) $\frac{a}{s - \log a}$
D) does not exist

34) Infinite inverse Fourier sine transform of e^{-as} over $0 < s < \infty$ is ______ where

$$F(x) = \sqrt{\frac{2}{\pi}} \int_0^\infty f_s(s) \cdot \sin sx \, ds$$

A) $\sqrt{\frac{2}{\pi}} \cdot \frac{x}{(a^2 + x^2)}$

B) $\sqrt{\frac{2}{\pi}} \cdot \frac{x}{(a^2 - x^2)}$

C) $\sqrt{\frac{2}{\pi}} \cdot \frac{1}{(a^2 + x^2)}$

D) $\sqrt{\frac{2}{\pi}} \cdot \frac{1}{(a^2 - x^2)}$

35) If L $\{f(t)\} = f(s)$ and $G(t) = f(t - a) \quad t > a$

$= 0 \quad t < a$

then $L\{G(t)\}$ = ________

A) $e^{as} \cdot f(s)$

B) $e^{-as} \cdot f(s)$

C) $e^{-s} \cdot f(s)$

D) $e^{-as} \cdot f'(s)$

36) $L\{e^{-4t} \cdot t^4\} =$_______

A) $\frac{4}{(s-4)^4}$

B) $\frac{5!}{(s-3)^4}$

C) $\frac{5!}{(s+3)^4}$

D) $\frac{4!}{(s+4)^5}$

37) $L^{-1}\left\{\frac{1}{(s-3)^2}\right\} =$________

A) $e^{2t} \cdot t$

B) $e^{3t} \cdot t$

C) $e^{3t} \cdot t^2$

D) $e^{t} \cdot t$

38) If $L\{f(t)\} = f(s)$ then $L^{-1}\{f(as)\} =$ ________

A) $a\,L^{-1}\left\{f\left(\frac{s}{a}\right)\right\}$

B) $2a\,L^{-1}\left\{f\left(\frac{s}{a}\right)\right\}$

C) $\frac{1}{a}L^{-1}\left\{f\left(\frac{s}{a}\right)\right\}$

D) $\frac{1}{a}L^{-1}\{f(s)\}$

39) $L^{-1}\left\{\frac{1}{(s^2+9)}\right\} =$ ______

A) $\frac{\sin 3t}{9}$

B) $\frac{\sin 3t}{3}$

C) $\frac{\sin 9t}{3}$

D) $\frac{\sin 9t}{9}$

40) $L^{-1}\left\{\log\left(\frac{s+4}{s+3}\right)\right\} =$ ________

A) $\frac{1}{t}\left\{e^{-3t} + e^{-2t}\right\}$

B) $\frac{-2}{t}\left\{e^{-4t} - e^{-3t}\right\}$

C) $\frac{2}{t}\left\{e^{-3t} + e^{-4t}\right\}$

D) $\frac{-1}{t}\left\{e^{-4t} - e^{-3t}\right\}$

41) In '*n*' jobs and two machines (say A and B) sequencing problems in which the order of processing is AB.

A) Job having minimum time on machine B is processed first

B) Job having minimum time on machine A is processed in the last

C) Job having minimum time on machine B is processed in the last

D) Job having maximum time on machine B is processed in the last

42) In 3 machines and 5 jobs problem, the processing times are given in the following table

Job	1	2	3	4	5
A	30	80	70	50	40
B	40	50	10	20	30
C	70	90	50	60	100

The optimum sequence would be : _______.

A) 1-5-4-3-2

B) 2-4-3-5-1

C) 4-1-3-2-5

D) 4-1-5-2-3

43) Let T = Total elapsed time to process all jobs through two machines M_1 and M_2, t_{2j} = Time required for processing jth job on machine M_2,

I_{2j} = Time for which machine M_2 remains idle after processing $(j-1)$th job and before starting work on jth job. Then _______ .

A) $T = \Sigma_{j=1}^{n} t_{2j} + \Sigma_{j=1}^{n} I_{2j}$

B) $T > \Sigma_{j=1}^{n} t_{2j} + \Sigma_{j=1}^{n} I_{2j}$

C) $T < \Sigma_{j=1}^{n} t_{2j} + \Sigma_{j=1}^{n} I_{2j}$

D) $T = \Sigma_{j=1}^{n} t_{2j} - \Sigma_{j=1}^{n} I_{2j}$

44) Using Dominance method following matrix can be reduced to _______ .

$$\begin{bmatrix} -5 & 10 & 20 \\ 5 & -10 & -10 \\ 5 & -20 & -20 \end{bmatrix}$$

A) $\begin{bmatrix} 10 & 20 \\ -10 & -10 \end{bmatrix}$

B) $\begin{bmatrix} 5 & -10 \\ 5 & -20 \end{bmatrix}$

C) $\begin{bmatrix} -5 & 10 \\ 5 & -10 \end{bmatrix}$

D) $\begin{bmatrix} -10 & -10 \\ -20 & -20 \end{bmatrix}$

45) Which statement is true about the game $\begin{bmatrix} 1 & -3 \\ 4 & 1 \end{bmatrix}$?

A) game is fair
B) value of the game is 4
C) value of the game is 1
D) no saddle point exists

46) A saddle point of a payoff matrix is that position in the matrix where _____ .

A) Maximum of row minima is equal to minimum of column maxima
B) Maximum of row minima is not equal to minimum of column maxima
C) Maximum of row minima is greater than to minimum of column maxima
D) Maximum of row minima is less than to minimum of column maxima

47) In Vogel's method, the difference between the smallest cost & second smallest cost for each row & column is called _____ .

A) Requirement
B) Saddle point
C) Penalty
D) Capacity

48) The dummy source or destination in a T.P. is introduced to _____.

A) Prevent solution to become degenerate
B) To satisfy rim conditions
C) Ensure that total cost does not exceed a limit
D) Solve the balanced transportation problem

49) Hungarian method is used to solve ________

A) Transportation problem
B) Assignment problem
C) 2 × 2 games
D) Linear programming problem

50) If m is the number of constraints in a linear programming with two variables x and y and non-negativity constraints $x \geq 0$, $y \geq 0$ the feasible region in the graphical solution will be surrounded by how many lines?

A) m
B) $m + 1$
C) $m + 2$
D) $m + n - 1$

51) The binary number 110101 in decimal notation is given by

A) 53 B) 35

C) 30 D) 50

52) Addition of binary numbers 1101 and 111 is

A) 11001 B) 10011

C) 10101 D) 10100

53) The premises $(p \wedge q) \vee r$ and $r \rightarrow s$ imply which of the conclusion?

A) $p \vee r$ B) $p \vee s$

C) $p \vee q$ D) $q \vee r$

54) A compound statement using "AND" is called

A) induction B) disjunction

C) conjunction D) negation

55) Which of the following statements is a Tautology?

A) $(p \rightarrow q) \leftrightarrow (\neg q \rightarrow \neg p)$ B) $(p \rightarrow q) \rightarrow (p \wedge q)$

C) $p \wedge \neg q$ D) $(p \wedge \neg q) \wedge (\neg p \vee q)$

56) Let G be a graph such that minimum degree of each vertex is at least 2 then

A) G is acyclic B) G is always connected

C) G contains at least one circuit D) G is always simple

57) Let G be a simple graph. Which of the following statements is true?

P : Adjacency matrix is symmetric.

Q : Trace of adjacency matrix is 1.

A) P only B) Q only

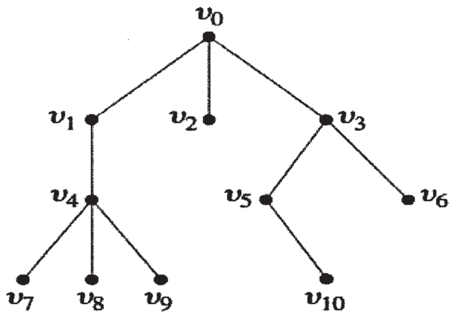
C) Both P and Q D) Neither P nor Q

58) The maximum number of edges in a simple graph G with n vertices is

A) $n(n-1)$ B) $2n$

C) $n(n+1)/2$ D) $n(n-1)/2$

59) Consider the tree with root v_0 shown below



The number of leaves on the tree are

A) 5 B) 6

C) 4 D) 9

60) In an Euler graph the degree of every vertex is

A) same B) even

C) odd D) prime

61) If f is a bounded function defined on $[a, b]$, then f is integrable on $[a, b]$ if and only if

A) $L(f) < U(f)$ B) $L(f) > U(f)$

C) $L(f) = U(f)$ D) $L(f) + U(f) = 0$

62) If $F(x) = \int_1^{\sqrt{x}} \sin t \, dt$, then $F'(x) =$ _______

A) $\dfrac{\sin\sqrt{x}}{2\sqrt{x}}$ B) $\sin\sqrt{x}$

C) $\dfrac{\sin\sqrt{x}}{\sqrt{x}}$ D) $\cos\sqrt{x}$

63) $\int_a^\infty \frac{dx}{x^p} dx$, where $x > a > 0$, is convergent if ________

A) $p = 1$
B) $p > 1$
C) $p \leq 1$
D) $p < 1$

64) If $f(x)$ is an even function then for Fourier series in $(-\pi, \pi)$, b_n = _______

A) ∞
B) $(-1)^{n+1}$
C) 0
D) -1

65) $\int_0^1 \frac{\sec x}{x} dx$ is ______

A) convergent
B) absolutely convergent
C) divergent
D) proper integral

66) Let g be continuous on $[a, b]$ and differentiable in (a, b). If g' is integrable on $[a, b]$, then

A) $\left|\int_a^b g\right| \leq \int_a^b |g|$
B) $\int_a^b g' = g(b) - g(a)$
C) $\left|\int_a^b g\right| \geq \int_a^b |g|$
D) $g(b) = g(a)$

67) The mesh of partition P is _______ of the subinterval comprising P.

A) Minimum length
B) Maximum length
C) Equal
D) None

68) $\lim_{x \to 0} \frac{1}{x} \int_0^x e^{t^2} dt =$ ________

A) e^{x^2}
B) 0
C) 1
D) $2e^{x^2}$

69) The series $\sum_{n=1}^{\infty} \frac{1}{n^2+1}$ is ______

A) divergent
B) convergent
C) oscillatory
D) none of these

70) $\int_{\pi}^{\infty} \frac{\sin^2 x}{x^2} dx$ is _______

A) convergent
B) divergent
C) oscillatory
D) proper integral

71) Let $\langle X, d \rangle$ and $\langle Y, \rho \rangle$ be two metric spaces and $f : X \rightarrow Y$ be a function. Then f is continuous if and only if $\overline{f^{-1}(B)} \subset f^{-1}(\overline{B})$ for every ______ .

A) set B of X
B) subset B of X
C) set B of Y
D) subset B of Y

72) If E is any subset of metric space M then which of the following statement is true?

A) $E \subset \overline{E}$
B) E is closed subset of M if $E = \overline{E}$
C) E is closed and $\overline{E} = \overline{\overline{E}}$
D) All the statements in (A), (B) and (C) are true

73) Every subset of R_d is ______.

A) both open and closed
B) only open
C) only closed
D) neither open nor closed

74) Let $\langle M_1, \rho_1 \rangle$ and $\langle M_2, \rho_2 \rangle$ be metric spaces and let $f : M_1 \Rightarrow M_2$. Then f is continuous on M_1 if and only if f^{-1} (G) is open in _______, whenever G is open in M_2.

A) M_1
B) M_2
C) $f(M_1)$
D) $f(M_2)$

75) Any polynomial function is _________ at each point in R^1.

A) continuous
B) discontinuous
C) not differentiable
D) always constant

76) The set in metric space X is closed if and only if its complement is ______

A) closed
B) open
C) always empty set
D) always X

77) The intersection of countable collection of open sets is

A) always open
B) always closed
C) need not be open
D) neither closed nor open

78) The set $\overline{E}$ of all limit points of E is called the ________

A) open set
B) closure of E
C) connected set
D) compact

79) If $a \in R_d$ then $\{a\}$ is __________

A) B $[a;1]$
B) open set in R_d
C) not open set in R_d
D) not closed set in R_d

80) If f is continuous at a and if $c \in R$ then cf is continuous

A) on R
B) at a
C) at c
D) at $a.c$

81) The greatest lower bound of the set $\{1/2^n \mid n \in N\}$ is ________.

A) ½
B) 1
C) 0
D) 2

82) The set of all ordered pairs of integers is _________

A) finite B) countable

C) uncountable D) none of these

83) Consider two statements

I) Every absolutely convergent series is convergent

II) Every Cauchy sequence of real numbers is not bounded

A) Only (I) is true B) Only (II) is true

C) Both (I) and (II) are true D) Both (I) and (II) are false

84) The series $\sum_{n=1}^{\infty}(-1)^{n+1}\frac{1}{n^p}$ converges for ________

A) $p < 0$ B) $p > 0$

C) $p = 0$ D) $p = -1$

85) $\{s_n\}=\{1,-1,1,-1,1,-1,.......\}$ is (C,1) summable to ________

A) -2 B) 0

C) 2 D) ½

86) Let H be a subgroup and K be a normal subgroup of the group G, then _____ is normal in H.

A) $H \cup K$ B) $H \cap K$

C) H+K D) none of these

87) Which of the following is not an ideal of a ring $(Z,+,\cdot)$?

A) $(2Z,+,\cdot)$ B) $(3Z,+,\cdot)$

C) $(6Z,+,\cdot)$ D) $(R,+,\cdot)$

88) The order of symmetric group s_5 is ______.

A) 40 B) 60

C) 120 D) 100

89) The rank of every n-rowed non-singular matrix is ______.

A) 0 B) $n \times n$

C) n D) ∞

90) The number of generators of the cyclic group of order 8 is

A) 1 B) 2

C) 3 D) 4

91) Left hand limit of $f(x)=\frac{|x|}{x}$ as $x \to 0$ is_______.

A) 1 B) –1

C) 0 D) does not exist

92) The function $f(x) = x^2 - 2x$ satisfies all the conditions of Lagrange's mean value theorem in [–1, 3], then the value of 'c' is ________

A) 0 B) 2

C) 1 D) –1

93) The function $u=\sin\left(\frac{x^2+y^2}{x+y}\right)$ is ________.

A) a homogeneous function of degree 1

B) a homogeneous function of degree 2

C) a homogeneous function of degree 0

D) not a homogeneous function

94) If $y = x^n$, then y_n =__________.

A) $n!$ B) 0

C) nx^{n-1} D) x^{n-1}

95) The maximum value of the function $f(x,y) = 2(x-y)^2 - x^4 - y^4$ at the point $\left(\sqrt{2},-\sqrt{2}\right)$ is ________.

A) 8 B) –8

C) 0 D) 16

96) The complete integral of $z = px + qy + \log(pq)$ is__________.

A) $z = ax + by + \log(ab)$
B) $z = ax + y \log a + c$
C) $z = ax - by + \log(ab)$
D) $z = ax - y \log a + c$

97) The order of partial differential equation $\left(\frac{\partial z}{\partial x}\right)^2 + \left(\frac{\partial z}{\partial y}\right)^2 = 3z$ is ________.

A) 2
B) 4
C) 1
D) 3

98) The complementary function of $x^2 \frac{d^2 y}{dx^2} - 2x\frac{dy}{dx} + 2y = x$ is ________.

A) $C_1 e^x + C_2 e^{2x}$
B) $C_1 e^{-x} + C_2 e^{-2x}$
C) $C_1 x + C_2 x^2$
D) $C_1 + C_2 x$

99) $\frac{1}{D-a} f(x) =$_______.

A) $e^{-ax} \int f(x) e^{-ax}\, dx$
B) $e^{-ax} \int f(x) e^{ax}\, dx$
C) $e^{ax} \int f(x) e^{ax}\, dx$
D) $e^{ax} \int f(x) e^{-ax}\, dx$

100) If $\frac{1}{N}\left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}\right)$ is function of x alone say $f(x)$, then integrating factor is ________.

A) $f(x)$
B) $e^{\int f(x)dx}$
C) $f(y)$
D) $e^{\int f(y)dy}$

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Rough Work