ਪੰਜਾਬ ਟੈਕਨੀਕਲ ਯੂਨੀਵਰਸਿਟੀ ਜਲੰਧਰ

PUNJAB TECHNICAL UNIVERSITY JALANDHAR

Max. Marks: 90 **Time: 90 Mins.**

Entrance Test for Enrollment in Ph.D. Programme

Important Instructions

- *Fill all the information in various columns, in capital letters, with blue/black ball point pen.*
- *Use of calculators is not allowed.*
- *All questions are compulsory. No negative marking for wrong answers.*
- *Each question has only one right answer.*
- *Questions attempted with two or more options/answers will not be evaluated.*

Stream(Engg/Arch/Pharm/Mgmt/App.Sci /life Sci/Lang/Humanities) .....

Discipline / Branch .....MATHEMATICS.....

Name .....

Father's name .....

Roll No. .....**Date : 15th July 2012**.....

Signature of the candidate .....

Signature of the invigilator .....

1. Let f be defined by $f(x) =$

$$\begin{cases} 0, & \text{if } x = 0 \\ x\sin(\frac{1}{x}), & \text{if } x \neq 0 \end{cases}$$

then the value of $D^{-}f(0)$ is given by

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

2. Which of the following statement is correct?

(A) A continuous function is always of bounded variation.
(B) A function f defined on [a,b] is bounded if and only if it can be expressed as difference of two monotonic trigonometric functions on [a,b].
(C) Both (A) and (B) are correct.
(D) None of these statements are correct.

3. A continuous image of a compact set is

(A) non-compact
(B) compact
(C) unbounded
(D) bounded.

4. Which of the following statement is correct ?

(A) Every Riemann integrable function is always continuous function
(B) Every differentiable function is always Riemann integrable
(C) Every Riemann integrable function is always differentiable

(D) Every Riemann integrable function is continuous and differentiable function

5 The interval of convergence of the series $\sum_{n=1}^{\infty}(-1)^n \frac{x^n}{n}$, is

(A) $(-1,1)$

(B) $(-1,1]$

(C) $[-1,1)$

(D) $[-1,1]$

6 The function

$f(x)=\begin{cases}0 & , \quad x \text{ is irrational} \\ 1 & , \quad x \text{ is rational}\end{cases}$, is

(A) continuous everywhere

(B) continuous at $x=0$ only

(C) continuous at $x=1$ only

(D) discontinuous everywhere

7 Given the statements:

I If E_1 and E_2 are measurable sets then so is $E_1 \cap E_2$.

II A countable union of measurable sets need not to be measurable again.

III Every Borel set in R is measurable.

Identify which of the following is correct, in connection with the above statements?

(A) I is true only

(B) II and III are true

(C) I and III are true

(D) All I,II,III are true.

8.Roll's theorem is applicable to which of the following function(s)?

I $f(x)=|x|$ over $[-1,1]$ II $f(x)=\tan x$ over $[0,\pi]$ III $f(x)=\frac{\sin x}{e^x}$ over $[0,\pi]$

(A) applicable to I only

(B) applicable to II only

(C) applicable to I&III only

(D) applicable to III only

9. Let A be a subset of a metric space (X,d). Then A is compact if and only if

(A) Every convergent sequence in A is a cauchy sequence.

(B) Every sequence in A has a subsequence which converges in A .

(C) Every Cauchy sequence in A converges in A.

(D) Every sequence in A has a Cauchy sub sequence.

10. In the real line R, with usual metric , the set Q of rationals are

(A) not bounded

(B) closed

(C) compact

(D) open

11. The direction in which the function $f(x)=(x^2/2)+(y^2/2)$ decreases most rapidly at the point (1, 1) , is given as

(A) $\frac{1}{\sqrt{2}}i+\frac{1}{\sqrt{2}}j$

(B) $\frac{1}{\sqrt{2}}i-\frac{1}{\sqrt{2}}j$

(C) $-\frac{1}{\sqrt{2}}i-\frac{1}{\sqrt{2}}j$

(D) $-\frac{1}{\sqrt{2}}i+\frac{1}{\sqrt{2}}j$

12. If a matrix $A=\begin{pmatrix}1 & 0\\ 1/2 & 1\end{pmatrix}$, then A^{50} is equal to

(A) $\begin{pmatrix}1 & 0\\ 0 & 50\end{pmatrix}$

(B) $\begin{pmatrix}1 & 0\\ 25 & 1\end{pmatrix}$

(C) $\begin{pmatrix}1 & 0\\ 50 & 1\end{pmatrix}$

(D) $\begin{pmatrix} 1 & 25 \\ 25 & 1 \end{pmatrix}$

13.The degree of nilpotence of the matrix $\begin{bmatrix} 6 & 9 \\ -4 & -6 \end{bmatrix}$, is

(A) Zero
(B) 1
(C) 2
(D) 4

14.The value of λ, for which the system of equations $x + y + z = 6,\ \ x + 2y + 3z = 10,\ \ x + 2y + \lambda z = \mu$ has no solution, is

(A) 10
(B) 6
(C) 3
(D) 2

15. If 0 is an eigen value of a matrix A ,then

(A) A is non singular
(B) One eigen value of A^{-1} is not defined
(C) A^{-1} does not exist
(D) Det(A)=1

16. The Eigen values of a skew Hermitian matrix are

(A) always Zeros
(B) non zero real numbers
(C) purely imaginary
(D) Zero or purely imaginary

17.Let R be a relation on the set N of natural numbers defined by nRm if and only if n is a factor of m. Then R is

(A) Reflexive, Symmetric but not transitive
(B) Transitive, symmetric but not reflexive
(C) Equivalence
(D) Reflexive, transitive but not symmetric

18.Let X be a set of 6 elements. How many relations on X are reflexive ?

(A) 2^6
(B) 2^{36}
(C) 6^2
(D) 6

19. In an inner product space V, let $W^{\perp}$ be an orthogonal complement of a subspace W of V. Then

(A) $W \cap W^{\perp} = \{0\}$
(B) $W \cap W^{\perp} \neq \{0\}$
(C) $W \cap W^{\perp} = \varphi$
(D) $W \cap W^{\perp} \neq \varphi$

20. Which of the following subsets of R^3, under the usual operations of addition and scalar multiplication, is a subspace of R^3 ?

(A) $U = \{(x, y, z) \mid x = 3y,\ z = -y\}$
(B) $U = \{(x, y, z) \mid x = z + 2\}$
(C) $U = \{(x, y, z) \mid x + y + z = 1\}$
(D) $U = \{(x, y, z) \mid x = 1\}$

21. Let U and W be two subspaces of a vector space V. The sum U+W is a direct sum of U and W if

(A) $U \cap W = \varphi$
(B) $U \cap W = \{0\}$
(C) $U \cap W \neq \{0\}$
(D) $U \cap W \neq \varphi$

22. If p is a prime number and G is non-abelian group of order p^3, then the centre of G has

(A) exactly p elements
(B) exactly $p - 1$ elements
(C) exactly p^3 elements
(D) exactly p^2 elements

23. If every element of a group G is its own inverse ,then the group G is

(A) finite
(B) infinite
(C) cyclic
(D) abelian

24. Which of the following statement(s) is incorrect ?

(A) Every field is a ring
(B) every ring is a group

(C) Every finite non zero integral domain is a field

(D) Every field is an integral domain

25.Let G be group of order 255 , then the number of sylow 5 subgroups G have , are

(A) 1 or 51

(B) 3 or 85

(C) 15 or 17

(D) none of these

26. In a finite non-zero commutative ring with unity

(A) a prime ideal need not be a maximal ideal

(B)a prime ideal is always a maximal ideal

(C)a maximal ideal need not be a prime ideal

(D)there do not exist prime and maximal ideals

27. Let S= {1,2,3,4,5} and let $f = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 2 & 3 & 5 & 1 & 4 \end{pmatrix}$ be the permutation .

Then the orbit of S under the given permutation is

(A) {1,2,3)

(B) {4,5)

(C) Set S itself

(D) {1,2}

28. The function $f(z) = |z|^2$ is

(A) Continuous and differentiable in whole complex plane

(B) Continuous in whole complex plane and is differentiable everywhere except at Origin

(C) Continuous in whole complex plane but is not differentiable anywhere

(D) Continuous in whole complex plane but is not differentiable in complex plain except at origin

29. The values of a,b,c,d for which the function $f(z) = (x^2+axy+by^2) + i\,(cx^2+dxy+y^2)$ is analytic are respectively

(A) 1,-1,-2, 2

(B) 2, 2,-1,1

(C) 2, -1,-1,2

(D) None of these

30. The harmonic conjugate of the function $u(x,y) = y^3-3x^2y$, is

(A) $-y^3+3x^2y+C$

(B) y^3-3xy^2+C

(C) x^3+3x^2y+C

(D) x^3-3xy^2+C

31. Principal value of the complex number $-8 - (8\sqrt{3})i$ is

(A) $2\pi/3$

(B) $\pi/3$

(C) $(-2\pi)/3$

(D) $(-\pi)/3$.

32. For any positive real number x, the value of the integral $\int_0^1 Arg(-x)\,dx$, is

(A) π

(B) $\pi/6$

(C) $\pi/2$

(D) $\pi/3$.

33. A woman hosting a birthday party wants to purchase a16 cans of soft drinks for his invited guests. The shop she visited fir the purpose has 4 different types of soft drinks, Limica. Coca-cola, Pepsi, and Maaza. If she purchases at least 5 cans of Coca- cola,how many different selections can she make?

(A) 1001

(B) 2008

(C) 3876

(D) 4335

34. Which of following statement (s) is correct ?

(A) If function $f(z) = u + iv$ satisfies C-R equations at a point then f is differentiable at that point.

(B) Given that $f(z) = u + iv$ is analytic in a domain D. Then u and v are harmonic in D.

(C) The function $e^{\bar{z}}$ is analytic at z = 0

(D) The function $\sin \bar{z}$ is nowhere analytic

35. The integral $\int_{|z|=2} \frac{\cos z}{z(z^2+9)} dz$ along $|z| = 2$ (positively oriented) has the value

(A) Zero

(B) $\frac{\pi i}{2}$

(C) $-\frac{\pi i}{4}$

(D) None of these..

36.The image of the right half –plane $x \geq 0,$ under the mapping $w = \frac{z-1}{z+1}$ is the

(A) right half-plane $u \geq 0$

(B) upper half-plane $v \geq 0$

(C) the circle $|w| \leq 1$

(D) none of these

37. The period of the function sin(iz +67) , is

(A) π

(B) $2\pi i$

(C) $-\pi$

(D) 2π

38. The branch of $w = Log(z + 4 - i)$ is

(A) $x \leq 0, y = 0$

(B) $x \leq 0, y = 1$

(C) $x \leq -4, y = 0$

(D) $x \leq -4, y = 1$

39. The matrix (T: B_1, B_2) associated with the linear transformation T : $R_2 \to R_2$ defined by T(x, y) = ($x, -y$) relative to the basis B_1= {(1,0),(0,1)} and B_2 ={(1,1),(1,-1)} is

(A) $\begin{pmatrix} \frac{1}{2} & -\frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{pmatrix}$

(B) $\begin{pmatrix} \frac{1}{2} & 0 \\ 0 & \frac{1}{2} \end{pmatrix}$

(C) $\begin{pmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & -\frac{1}{2} \end{pmatrix}$

(D) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$

40. The orthogonal trajectory of the family of the curves $xy = C$ is

(A) $x^2 + y^2$ = constant

(B) $x^2 - y^2 = xy$

(C) $x^2 - y^2$ = constant

(D) $x^2 + y^2 = xy$

41. If Wronskian of two solutions of equation $\frac{d^2y}{dx^2} + P(x)\frac{dy}{dx} + Q(x)\, y = 0$ is identically zero, then solutions are

(A) Linearly dependent

(B) Linearly independent

(C) Linearly dependent if one or both solutions are zero

(D) Can't say

42. Any differential equation $\frac{dy}{dx} = f(x, y)$ represents a

(A)A curve such that tangent to the curve at any point is having slope equal to value of f at that point

(B)A family of curve such that through every point of xy-plane, there passes more than one curve of the family

(C)A family of curve such that tangent to the curve at any point is having slope equal to value of f at that point

(D)A family of surfaces

43.The general solution of the equation $x^2 y^{//} + 2xy^{/} - 2y = 0$ is given by

(A) $y(x) = A\,x + (B / x^2)$

(B) $y(x) = A\,x + (B\,x^2)$

(C) $y(x) = A\,(1/x) + (B / x^2)$

(D) $y(x) = A + (B / x^2)$

44. The differential equation of the system of circles touching the y -axis at origin is

(A) $\frac{d^3 y}{dx^2} = 0$

(B) $x\frac{dy}{dx} + x^2 + y^2 = 0$

(C) $2xy\frac{dy}{dx} + x^2 - y^2 = 0$

(D) $x^2 + y^2 - 2\frac{dy}{dx} = 0$

45.The curve satisfying $y\,dx - xdy + \ln(x)dx = 0$ for $x > 0$ and passing through $(1, -1)$ Is

(A) $y - \ln(x) + 1 = 0$

(B) $y + \ln(x) + 1 = 0$

(C) $y\,\ln(x) - 1 = 0$

(D) $y - \ln(x) - 1 = 0$

46. If $\frac{1}{x}$ is a one of the solution of the differential equation $x^2 y'' + 4xy' + 2y = 0$, then the second linearly independent solution is

(A) $-\frac{1}{x}$

(B) $-\frac{1}{x^3}$

(C) $-\frac{1}{x^2}$

(D) None of these

47. The solution of the partial differential equation $(y - z)p + (z - x)q = x - y$ is represented as

(A) $f(x^2 + y^2 + z^2) = xyz$

(B) $f(x + y + z) = xyz$

(C) $f(x + y + z) = x^2 + y^2 + z^2$

(D) $f(x^2 + y^2 + z^2) = x + y$

48. The relation $z = f(x^2 - y^2)$ represents the partial differential equation

(A) $x\frac{\partial z}{\partial x} + y\frac{\partial z}{\partial y} = 0$

(B) $y\frac{\partial z}{\partial x} + x\frac{\partial z}{\partial y} = 0$

(C) $\frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = 0$

(D) $x^2\frac{\partial z}{\partial x} + y^2\frac{\partial z}{\partial y} = 0$

49. Particular integral of the equation $2\frac{\partial^2 z}{\partial x^2} - 3\frac{\partial^2 z}{\partial x \partial y} + \frac{\partial^2 z}{\partial y^2} = e^{x+2y}$ is

(A) $\frac{1}{2}e^{x+2y}$

(B) $-\frac{x}{2}e^{x+2y}$

(C) $x\,e^{x+2y}$

(D) None of these

50. The partial differential equation

$$y^2u_{xx} - 2xyu_{xy} + x^2u_{yy} = \frac{y^2}{x}u_x + \frac{x^2}{y}u_y$$

represents

(A) a parabolic equation
(B) an elliptic equation
(C) a hyperbolic equation
(D) None of these

51.The complete integral of $q = 3p^2$ is

(A) $z = ax + 3a^2y + b$

(B) $z = ax + 3a^2y$

(C) $z = ax + 3a^2y^2 + b$

(D) None of these

52. For the Lagrange's interpolation formula $P_n(x) = \sum_{i=0}^{n} l_i(x)\ f_i$, an important check during the calculation is

(A) $\sum_{i=0}^{n} l_i(x) = 0$

(B) $\sum_{i=0}^{n} l_i(x) = 1$

(C) $\sum_{i=0}^{n} l_i(x) = cons\tan t$

(D) $\sum_{i=0}^{n} l_i(x) = 2$

53. On applying Variation of parameter method to the equation $y^{//} + y = \sec x$, the value of wronskian is

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

54. Newton –Raphson method is most effective to solve the equation $f(x) = 0$ when graph of $y = f(x)$ while crossing the x- axis is

(A) nearly horizontal
(B) nearly vertical
(C) inclined at 45^0 to x- axis
(D) inclined at 45^0 to x- axis

55. For certain function $f(x)$, divided differences are given as

$f[-1] = 2,\ f[-1,1] = 1,\ f[-1,1,2] = 2$.
Then the value of $f[2]$ is

(A) 11
(B) 12
(C) 14
(D) 13

56. In Simpson's 1/3 rule, $f(x)$ is approximated with polynomial of degree

(A) one
(B) two
(C) three
(D) four

57. The curve, on which the functional $\int_0^1 [(y')^2 + 12xy]\,dx$ with y(0) = 0 and y(1)=1 can be extremised is

(A) $y = x^2$

(B) $y = x$

(C) $y = x^3$

(D) $y = \frac{1}{x}$

58. The integral equation

$y(x) = [\int_0^x (x+t)y(t)dt\,] + 1$, is equivalent to which of the following initial value problem is given by

(A) $y^{//}(x) - 2xy^{/}(x) - 3y(x) = 0$,
$y(0) = 1, y^{/}(0) = 0$

(B) $y^{//}(x) + xy^{/}(x) - 3y(x) = 0$,
$y(0) = 0, y^{/}(0) = 0$

(C) $y^{//}(x) - 2xy^{/}(x) + y(x) = 0$,
$y(0) = 1, y^{/}(0) = 1$

(D) None of these.

59. Solution of the integral equation

$y(x) = 3x^2 + \int_0^x y(t)\sin(x-t)\,dt$, is given by

(A) $y = 3x + x^3/2$

(B) $y = 3x^2 + x^4/4$

(C) $y = 3x^2 + x^3/2$

(D) $y = 3x + x^4/2$

60. The degree of freedom for a 5 particle system having holonomic constraints expressible in 4 equations, is

(A) 1
(B) 9
(C) 11
(D) 12

61. If Lagrangian of a dynamical system is given by $L(q_1, q_2, q_3) = {q_2}^2 + \dot{q}_2 q_3$ then its cyclic coordinates are

(A) only q_1
(B) q_1, q_2
(C) only q_2
(D) q_1, q_3

62 Hamilton equation, corresponding to Hamiltonian $H = \frac{1}{2}m(r^2 + r^2\dot{\theta}^2)$ in case of a particle of mass 'm' moving under a central force, provides

(A) $m^2 r^2 \dot{\theta} = c$
(B) $mr\dot{\theta}^2 = c$
(C) $mr^2\dot{\theta} = c$
(D) $mr\dot{\theta} = c$

63. A rigid body is rotating about its centroid and let $\omega = [u, v, w]$ be the angular velocity at any time t then Euler's Dynamical equations are

(A) $\dot{u} + vw = 0, \dot{v} - uw = 0, 16\dot{w} + 9uv = 0$
(B) $\dot{u} - vw = 0, \dot{v} - 16uw = 0, 16\dot{w} + 9uv = 0$
(C) $9\dot{u} + vw = 0, \dot{v} - uw = 0, 16\dot{w} + 9uv = 0$
(D) $\dot{u} + vw = 0, \dot{v} - uw = 0, 9\dot{w} + 16uv = 0$

64. Out of regression lines

$3x + 12y = 9$, $3y + 9x = 46$ the

regression line of y on x is

(A) $3y + 9x = 46$
(B) $3y + 9x = 46$ if $y < x$
(C) $3x + 12y = 9$
(D) $3x + 12y = 9$ if $x > y$

65. *X* and *Y* are independent random variables. The mean and variance of *X* are 2 and 1 respectively. The mean and variance of *Y* are 3 and 2 respectively. Which of the following statements about the random variable *X* - *Y* is true?

(A) X - Y has mean -1 and variance -1
(B) X - Y has mean 5 and variance 3.
(C) X - Y has mean 5 and variance -1
(D) X - Y has mean -1 and variance 3.

66. If the coefficient of Kurtosis of a distribution is zero, then the frequency curve is:

(A) Leptokurtic
(B) Platykurtic
(C) Mesokurtic
(D) can not say

67. In a city 60% read newspaper A, 40% read newspaper B and 30% read newspaper C, 20% read A and B, 30% read A and C, 10% read B and C. Also 5% read paper A, B and C. The percentage of people who do not read any of these newspapers is:

(A) 90%
(B) 75%
(C) 25%
(D) 40%

68. If F(x, y) is a monotonic non decreasing cumulative distribution function of two-dimensional random variables X and Y, then F(x, y) satisfies the relation:

(A) $F(-\infty, y) = F(x, -\infty) = 0, F(\infty, \infty) = 1$
(B) $F(-\infty, y) = F(x, -\infty) = 1, F(\infty, \infty) = 1$
(C) $F(-\infty, y) = F(x, -\infty) = F(\infty, \infty) = 0$
(D) None of the these.

69. If β is the probability of Type-II error, then the power of the test is

(A) $(1+\beta)$
(B) $1/\beta$
(C) $(1-\beta)$
(D) $(2-\beta)$

70. If the moment generating function of a random variable X is $\left(\frac{1}{3}+\frac{2}{3}e^{t}\right)$, then X is:

(A) Binomial variate
(B) Poisson variate
(C) Normal variate
(D) Bernoulli variate

71. The degrees of freedom for χ^2 in case of contingency table of order (4x3) are:

(A) 3
(B) 6
(C) 11
(D) 12

72. If $E(X+2) = 7$ and $E((X+5)^2) = 150$, then the value of Var(X) is

(A) 50
(B) 101
(C) 120
(D) 143

73. For an exponential distribution with probability density function

$f(x) = \frac{1}{2}e^{-\frac{x}{2}}; x \geq 0$, the mean and variance are

(A) 2, 1/3
(B) 2, 4
(C) 2,1/4
(D) None of these

74. Kolmogorov- Smirnov test is useful as:

(A)A test of goodness of fit
(B)A test of identicalness of two populations

(C) A measure of confidence band
(D) All of these

75. To test the randomness of a sample, the appropriate test is:
(A) Run test
(B) Sign test
(C) Median test
(D) Page's test

76. Which of the following statement is not true?
(A)Standard error cannot be zero
(B)Standard error cannot be 1
(C)Standard error can be negative
(D)All the above

77. While analysing the data of a k×k latin square, the error degree of freedom in analysis of variance is equal to:
(A) (k-1)(k-2)
(B) K(k-1)(k-2)
(C) K^2-2
(D)K^2-k-2

78. If an experiment involves two or more treatments in which some treatments are fixed and the others are of random nature, one should choose:
(A)Analysis of variance model
(B)Components of variance model
(C)Mixed effect model
(D)None of the above

79. Regularity conditions of Crammer-Rao inequality are related to:
(A)integrability of functions
(B)differentiability of functions
(C) both (A) and (B)
(D) neither (A) and (B)

80. The maximum likelihood estimators are necessarily:
(A) unbiased
(B) sufficient
(C) most efficient
(D) unique

81. If $P(0 < z < 1.85) = 0.4678$ and $P(0 < z < 0.90) = 0.3159$, then the area under the standard normal curve which lies between $z = 0.90$ and $z = -1.85$ is

(A) 0.1519
(B) 0.9356
(C) 0.6318
(D) None of these

82. 3 % of the electric bulbs manufactured by a company are defective. The probability that a sample of 100 bulbs has no defective bulb is given by
(A) e^{-3}
(B) $1 - e^{-3}$
(C) $3e^{-3}$
(D) $1 + e^{-3}$

83 Degeneracy occurs when
(A) Basic variables are positive but some of non-basic variables have negative values
(B) The basic matrix is singular and has no inverse
(C) Some of basic variables have zero values
(D) Some of non-basic variables have zero values

84. Which of the following sets is not convex?
(A) $\{(x, y) \mid x \geq 2,\ y \leq 3\}$
(B) $\{(x, y) \mid 3x^2 + 2y^2 \leq 6\}$
(C) $\{(x, y) \mid y^2 \leq x\}$
(D) $\{(x, y) \mid 3 \leq x^2 + y^2 \leq 5\}$

85. The number of iterations taken by Simplex method for solving an LPP in its standard form, with m equations and n unknowns (m < n) cannot exceed
(A) ${}^{m}C_{n}$

(B) ${}^{m}P_{n}$
(C) ${}^{n}C_{m}$
(D) ${}^{n}P_{m}$

86. n letters are placed at random in n addressed envelopes. The probability that all letters are not placed in the right envelope is

(A) $\dfrac{1}{(n-1)!}$

(B) $1-\dfrac{1}{n!}$

(C) $\dfrac{1}{n}$

(D) $1-\dfrac{1}{n}$

87. If $x=a$ is the root of the equation $f(x)=0$ with multiplicity 2, then the Newton- Raphson method converges
(A) Linearly
(B) Quadratically
(C) Cubically
(D) None of these

88. Which of the followings is a convex region?

(A) 

(B) 

(C) 

(D) None of these

89. The mean and standard deviation of a Binomial distribution are 10 and 2 respectively, then the value of p (the probability of success) is

(A) 0.3
(B) 0.6
(C) 0.2
(D) 0.4

90. If $P(B)\neq 1$, then $P(\overline{A}\mid\overline{B})$ is equal to

(A) $\dfrac{P(A\cup B)}{P(B)}$

(B) $\dfrac{1-P(A\cup B)}{P(\overline{B})}$

(C) $\dfrac{P(\overline{A\cup B})}{P(B)}$

(D) $\dfrac{P(A\cap B)}{P(A)}$