# MULTIPLE CHOICE QUESTIONS

**1.** The value of the integral $\int_0^1 (1 - x^3)^{\frac{1}{2}} dx$ is:

A. 0  B. 2/3
C. 1  D. none of these

**2. In the trapezoidal rule, we approximate the integrand over every subinterval by:**

A. a st. line segment
B. an arc of a parabola
C. an arc of a circle
D. an arc of an elipse

**3.** Given the data

| $x$: | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| $f(x)$: | 1 | 2 | 7 | 20 | 33 |

then, by applying the trapezoidal rule, an approximate value of $\int_0^4 f(x)dx$ is:

A. 42  B. 46
C. 63  D. 126

**4.** To apply Simpson's 1/3rd rules, the number of sub-divisions of the range of integration must be a multiple of:

A. 2  B. 3
C. 5  D. 7

**5.** The smallest positive real root of the equation $\tan x - x = 0$ lies in:

A. $(0, \pi/2)$  B. $(\pi/2, \pi)$
C. $(\pi, 3\pi/2)$  D. none of these

**6.** The equation $x^3 + x^2 - 3x - 4 = 0$ has a real root in the interval

A. $(-2, -1)$  B. $(-1, 0)$
C. $(0, 1)$  D. $(1, 2)$

**7.** By applying one iteration of Newton-Raphson method, the approximate root of the equation $x^3 - 6x + 2 = 0$, lying in the interval $(0, 1)$, is:

A. 0.200  B. 0.250
C. 0.333  D. 0.456

**8.** In order to approximate a real root of the equation $x^3 - x - 4 = 0$ by Newton-Raphson method, if we take the initial value $x_0 = 2$, the the first iteration gives the $x$ value:

A. 9/5  B. 16/9
C. 20/11  D. 24/11

**9.** In the following system of equations:

$9x + 2y - 4z = 20$
$x + 10y + 4z = 6$
$2x - 4y + 10z = -15,$

if we take $y = z = 0$, then the approximate solution $(x, y, z)$ at the first iteration is given by:

A. $(1, 0, 0)$
B. $(0, 2, 3)$
C. $(2.2, 0.7, 1.5)$
D. $(2.2, 0.38, -1.8)$

**10.** The value of the integral $\int_0^1 \left(1 + e^{-x^2}\right) dx$ is:

A. $-1$  B. 2
C. $1 + e^{-1}$  D. none of these

**11.** $\int \frac{(\log x - 1)}{(\log x)^2} dx$ equals:

A. $(x/\log x) + c$
B. $(\log x/x) + c$
C. $[(\log x)^2 - 2x/\log x] + c$
D. none of these

**12.** $\int \left[\frac{\log_e (x+1) - \log_e x}{x(x+1)}\right] dx$ equals:

A. $C - \log (x + 1)/x$
B. $C - ½ [\log (x + 1)/x]^2$
C. $C - \log [\log (x + 1/x)]$
D. $C - ½[\log(x + 1)^2 - \log(x)^2]$

13. $\int_a^b f(a+b-x)dx$ can always be expressed as:

A. $\int_a^b f(x)dx$  B. $\int_b^a f(x)dx$

C. $\int_{a-b}^{a+b} f(x)dx$  D. $(a+b)\int_a^b f(x)dx$

14. $\int_{-\pi}^{\pi}(1-x^2)\sin x\cos^2 x\,dx$ equals:

A. 0  B. $\pi-(\pi^3/3)$

C. $2\pi-\pi^3$  D. none of these

15. $\int_0^{\pi/2}\sin^3 x\sqrt{\cos x}\,dx$ is:

A. $-4/15$  B. 4/15

C. 4/21  D. 8/21

16. The function $f(x) = x^3 + 5x^2 - 1$ is strictly decreasing in the interval:

A. $-3 < x < 3$  B. $0 < x < \infty$

C. $-\frac{10}{3} < x < 0$  D. $-\infty < x < -\frac{10}{3}$

17. The interval on which the function $f(x) = x/(x^2+9)$ is strictly increasing, is:

A. $-3 < x < 3$  B. $0 < x < 9$

C. $0 < x < \infty$  D. $-\infty < x < \infty$

18. At the point $x = 0$, the function $f(x) = x^4$ has

A. a local minimum value

B. a local maximum value

C. neither maximum nor minimum value

D. no value

19. For $0 < a \le x$ the minimum value of the function $y = \log_x a + \log_a x$ is:

A. 0  B. 1

C. 3  D. $2\log_a e$

20. The least value of the sum of any positive real number and its reciprocal is:

A. 1  B. 2

C. 3  D. 4

21. The largest fraction whose denominator exceeds the square of its numerator by 16, is:

A. 1/8  B. 1/10

C. 1/17  D. 3/25

22. The point on the graph of the function $f(x) = x^2$ which lies closest to the point (0, 1) is:

A. (0, 0)  B. (1, 1)

C. $(1, \sqrt{2}, 1/2)$  D. $(1/\sqrt{3}, 1/3)$

23. The point on the straight line $y = x$ such that the sum of the squares of its distances from the points $(a, 0)$, $(-a, 0)$ and $(0, b)$ is a minimum, is:

A. (0, 0)  B. $(a, a)$

C. $(b, b)$  D. $(b/6, b/6)$

24. The function $f(x) = x^x$ has a minimum value when $x$ is equal to:

A. $-1$  B. 0

C. 1  D. $1/e$

25. The maximum value of $\left(\frac{\log x}{x}\right)$ is:

A. 1  B. $e$

C. $1/e$  D. $2/e$

26. The total number of numbers greater than 100 and divisible by 5 that can be formed from the digits 3, 4, 5, 6, if no digit is reapted, is:

A. 12  B. 24

C. 36  D. 48

27. Matches were played in a football tournament each team met its opponent only once. The number of teams that took part in the tournament is:

A. 7  B. 8

C. 9  D. 10

28. Given 5 lines segments of lengths 2, 3, 4, 5, 6, units, then the number of triangles that can be formed by joining these lines, is:

A. ${}^5C_3$  B. ${}^5C_3 - 1$

C. ${}^5C_3 - 2$  D. ${}^5C_3 - 3$

29. The sides $AB$, $BC$ and $CA$ of a triangle $ABC$ have 3, 4 and 5 interior points respectively on them. The number of triangles that can be constructed using these interior points as vertices, is:

A. 205 B. 208
C. 220 D. 380

30. If $a, b, c, d$ and $p$ are distinct real numbers such that $(a^2 + b^2 + c^2)\,p^2 - 2\,(ab + bc + cd)p + (b^2 + c^2 + d^2) \le 0$, then $a, b, c$ and $d$ are in:

A. *A.P.*
B. *G.P.*
C. *H.P.*
D. no definite sequence

31. The ratio of the H.M. and G.M. of two numbers is 12 : 13 then the numbers are in the ratio.

A. 2 : 3 B. 3 : 5
C. 4 : 7 D. 4 : 9

32. Four numbers are in G.P. If the product of the second and the third terms is 4, then the product of all the four terms is:

A. 8 B. 12
C. 16 D. 32

33. The third term of a G.P. is 3 then the product of its first five terms is:

A. $5^3$ B. $5^1$
C. $3^5$ D. none of these

34. The continued product of three numbers in G.P. is 8, and the sum of their products taken in pairs is 21, then the numbers are:

A. 1/4, 2, 16 B. [illegible], 4, 8
C. 1/8, 2, 32 D. 1/2, 2, 8

35. The second term of a G.P. is 1 and the sum of its infinite number of terms is 4, then its first term is:

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

36. If each term of a G.P. is positive and each term is the sum of its two succeeding terms, then the common ratio of the G.P., is:

A. $\left(\sqrt{5}-1\right)/2$ B. $\left(\sqrt{5}+1\right)/2$
C. $-\left(\sqrt{5}+1\right)/2$ D. $\left(1-\sqrt{5}\right)/2$

37. In an infinite G.P. whose terms are positive, each term is equal to twice the sum of all terms which follow it, then the common ratio of the G.P. is:

A. 1/2 B. 1/3
C. $\left(\sqrt{3}-1\right)$ D. $\left(\sqrt{5}-1\right)/2$

38. The value of $\log\tan 1^\circ + \log\tan 2^\circ + \ldots + \log\tan 89^\circ$ is:

A. 0 B. 1
C. $\infty$ D. none of these

39. The real roots of the equation $7\log_7(x^2 - 4x + 5) = (x - 1)$ are:

A. 1 and 2 B. 2 and 3
C. 3 and 4 D. 4 and 5

40. The roots of the equation $4^x - 3 \times 2^{x+3} + 128 = 0$ are:

A. 1 and 2 B. 2 and 3
C. 3 and 4 D. 4 and 5

41. The roots of the equation $(q - r)x^2 + (r - p)x + (p - q) = 0$ are:

A. $(p - q)/(q - r)$ and 1
B. $(q - r)/(p - q)$ and 1
C. $(r - p)/(p - q)$ and 1
D. $(r - p)/(q - r)$ and 1

42. If $\cot\alpha$ and $\cot\beta$ are the roots of the equation $ax^2 + bx + c = 0$, then the value of $\cot(\alpha + \beta)$ is:

A. $(c - a)/b$ B. $(a - c)/b$
C. $(b - c)/a$ D. $(c - a)/a$

43. The quadratic equation with real coefficients whose one of roots is $1 - i$, is:

A. $x^2 - 2x + 1 = 0$ B. $x^2 + 2x - 1 = 0$
C. $x^2 - 2x - 2 = 0$ D. $x^2 - 2x + 2 = 0$

44. If the equations $x^2 - rx + pq = 0$ and $x^2 + qx - rp = 0$ have a common root, then $p$, $q$ and $r$ satisfy:

A. $p + q + r = 0$ B. $p + q - r = 0$

C. $p - q - r = 0$ D. $p + q - 2r = 0$

45. For the set of all straight lines in the plane, the relation of "perpendicularity" is:

A. reflexive but neither symmetric nor transitive

B. symmetric but neither reflexive nor transitive

C. transitive but neither reflexive nor symmetric

D. neither reflexive nor symmetric nor transitive

46. The set of real numbers lying between 0.999... (recurring 9") and 1, is:

A. null B. singleton

C. infinite D. none of these

47. If $A$ and $B$ are subsets of a universal set $U$, then $A \cap (A \cup B)'$ equals:

A. $\phi$ B. $A$

C. $B$ D. none of these

48. The number of all subsets of a finite set of $n$ elements is:

A. $\lfloor n$ B. $2^n$

C. $n^n$ D. $n^2$

49. If $A$, $B$ and $C$ are non-empty sets then $(A - B) \cup (B - A)$ equals:

A. $(A \cup B) - B$

B. $A - (A \cap B)$

C. $(A \cup B) - (A \cap B)$

D. $(A \cap B) \cup (A \cup B)$

50. For non-empty sets $A$ and $B$, if $A \subseteq B$, then $(A \times B) \cap (B \times A)$ equals:

A. $A \times A$ B. $B \times B$

C. $A \cap B$ D. none of these

51. Out of 100 people surveyed, 33 smoked, 57 drank and 27 did both. The number of persons who did neither, is:

A. 10 B. 32

C. 36 D. 37

52. A binary operation $o$ is defined in the set $Z$ of all integers by $a \; o \; b = 2a^2 + 3b^2 - 5ab$, $\forall \; a, b \in Z$. If $p \; o \; 1 = 1$, then $p$ equals:

A. 1 B. 2

C. 3 D. none of these

53. A binary operation $o$ is defined in $N$ by $a \; o \; b = b^a$, then $(3 o 2)^3$ equals:

A. 64 B. 256

C. 512 D. 1024

54. If $(a, b)$ is on a line with slope 3/4, then another point lying on the same line has coordinates:

A. $(a - 3, b - 4)$ B. $(a + 4, b + 3)$

C. $(a + 3, b + 4)$ D. $(a + 4, b + 4)$

55. If the point $P(1, y)$ lies on the perpendicular bisector of the line segment whose end points are $A(-1, 2)$ and $B(-3, 0)$, then $y$ equals:

A. $-2$ B. $-4$

C. 2 D. 4

56. Given the line $y = \frac{3}{4}x + 6$ and another line $L$ parallel to this line and at a distance of 4 units from it. Then a possible equation for $L$ is:

A. $y = \frac{3}{4}x$ B. $y = \frac{3}{4}x + 1$

C. $y = \frac{3}{4}x + 2$ D. $y = \frac{3}{4}x + 10$

57. If $a, b, c$ are real number such that $3a + 2b + 4c = 0$, then the family of straight lines $ax + by + c = 0$ will always pass through:

A. (3/4, 1/2) B. (1/2, 3/4)

C. (4/3, 2) D. (−1, 2)

58. If $a$, $b$, $c$ are in A.P. then the fixed point through which the straight line $ax + 2by + c = 0$ will always pass, is:

A. (1, −2) B. (−1, 1)

C. (1, −1) D. (−1, 2)

59. Let $X$ be the set of all real numbers except (-1). A binary operation $o$ is defined in $X$ by $x \, o \, y = x + y + xy$, $\forall\, x, y \in X$. Then the identity element under this operation is:

A. -1 B. 0

C. 1 D. none of these

60. A point on the curve $y = x^2$ which is closest to the line $2x - y - 4 = 0$, is:

A. (0, 0) B. (1, 1)

C. (2, 4) D. (3, 9)

61. The locus of the mid-points of the portions of the variable line $x \cos\alpha + y \sin\alpha = p$, intercepted between the coordinate axes, is:

A. $x^2 + y^2 = 4p^2$ B. $x^2 + y^2 + 4/p^2$

C. $x^{-2} + y^{-2} = 4/p^2$ D. $x^{-2} + y^{-2} = 4p^2$

62. The distance between the lines $3x + 4y = 9$ and $6x + 8y = 15$, is:

A. 3/2 B. 3/10

C. 6 D. 6/5

63. The value of $h$ for which the equation $3x^2 + 2hxy - 3y^2 - 40x + 30y - 75 = 0$ represents a pair of straight lines, is:

A. 1 B. 2

C. 3 D. 4

64. If the pairs of straight lines $x^2 - 2pxy - y^2 = 0$ and $x^2 - 2qy - y^2 = 0$ be such that each pair bisects the angle between the other pair, then the correct relationship is:

A. $pq = 0$ B. $pq = -1$

C. $pq = 1$ D. none of these

65. There are 10 original and 3 duplicate items in an automobile shop and 3 items are bought by a customer at random. The probability that none of the items is duplicate, is:

A. 1/[illegible] B. 20/91

C. 22/[illegible] D. 24/91

66. 10% bulbs manufactured by a company are defective. The probability that 3 out of 4 bulbs bought by a customer will not be defective, is:

A. $^{4}C_3/^{100}C_4$ B. $^{90}C_3/^{96}C_4$

C. $^{90}C_3/^{100}C_4$ D. $^{90}C_3 \cdot {}^{10}C_1/^{100}C_4$

67. The product $32 \cdot 32^{1/6} \cdot 32^{1/36}$ ..... *inf.* equals:

A. 64 B. 128

C. 256 D. none of these

68. The series $1 + \frac{1}{(1-x)} + \frac{1}{(1-x)^2} + \ldots$ ad. inf., may be summed, if:

A. $|x| < 1$ B. $|1 - x| < 1$

C. $|1 - x| > 1$ D. $|1 - x| = 1$

69. The $nth$ term of a series is $n(n + 1)/2$ then the sum of a series to $n$ terms is:

A. $n^2(n + 1)/2$

B. $n(n + 1)(n + 2)/6$

C. $n(n + 1)(2n + 1)/6$

D. $\left\{\frac{n(n+1)}{2}\right\}^2$

70. The sum of the series $1 + \frac{1}{1+2} + \frac{1}{1+2+3} + \ldots$ ad. inf., is:

A. [illegible]/2 B. 5/2

C. 2 D. none of these

71. The sum of the series $\frac{1}{1 \cdot 2} + \frac{1}{2 \cdot 3} + \frac{1}{3 \cdot 4} + \ldots$ ad. inf., is:

A. 8/9 B. 1

C. 4/3 D. none of these

72. There are $r$ copies each of $n$ different book. The number of ways in which these may be arranged in a shelf, is:

A. $n!/(n - r)!$ B. $n!/r!$

C. $(nr)!/r!$ D. $(nr)!/(r!)^n$

73. The number of ways in which $r$ letters can be posted in $n$ letter boxes in a town, is:

A. $n^r$ B. $r^n$

C. $^nP_r$ D. $^nC_r$

74. The sum of the squares of first $n$ even natural

numbers, is:

A. $2n(1+n^2)$ B. $2n(n+1)^2$

C. $\frac{n(n+1)(2n+1)}{6}$ D. $\frac{2n(n+1)(2n+1)}{3}$

75. The sum of positive integers less then 100 and *not* divisible by 4, is:

A. 1200 B. 3750

C. 3850 D. 4950

76. The sum of all Positive integers less than 100 which are not divisible by 2 or 5 is:

A. 4950 B. 3750

C. 3400 D. 2000

77. The angles of a pentagon are in A.P. One of the angles, in degrees, must be:

A. 54 B. 72

C. 90 D. 108

78. If $a$, $b$, $c$ are in A.P. as well as in G.P. then which of the following is true?

A. $a = b \neq c$ B. $a \neq b = c$

C. $a = b = c$ D. $a \neq b \neq c$

79. A number is chosen at random from the first 30 natural numbers. The probability of the number chosen being a multiple of 2 or 3, is:

A. 1/2 B. 3/5

C. 7/10 D. none of these

80. A number is chosen at random from among the first 30 natural numbers. The probability of the number chosen being a prime, is:

A. 1/3 B. 3/10

C. 1/30 D. 11/30

81. For non-zero real numbers $x$ and $y$, the equation $(x+y)^2 \sec^2\theta = 4xy$ is possible only when:

A. $x + y = 0$ B. $x = y = 1$

C. $x - y = 0$ D. $x - y = 1$

82. The expression $(\cos\theta + \sin\theta)$ has the maximum value when $\theta$ is equal to:

A. 30° B. 45°

C. 60° D. 90°

83. The minimum value of $(\cos x + \sqrt{3}\sin x - 1)$ is:

A. −1 B. −2

C. −3 D. $-\sqrt{3}$

84. The maximum value of

$$\left[3 + 5\cos\theta + 3\cos\left(\theta + \frac{\pi}{3}\right)\right]$$ is:

A. 4 B. 10

C. 11 D. $3 + \sqrt{34}$

85. In a triangle $ABC$, the angles $A$, $B$ and $C$ are in $A.P.$ If $b : c = \sqrt{3} : \sqrt{2}$ then $< A$ is equal to:

A. 30° B. 45°

C. 60° D. 75°

86. The elimination of the arbitrary constants $a$ and $b$ in $\frac{x}{a} + \frac{y}{b} = 1$ leads to the D.E.

A. $y - x\,dy/dx = 0$

B. $y\,dy/dx + x = 0$

C. $d^2y/dx^2 = 0$

D. $x\,d^2y/dx^2 - 2\,dy/dx = 0$

87. The elimination of the arbitrary constants $A$ and $B$ from $y = Ae^x$ leads to the D.E.

A. $yy_2 - y_1^2 = 0$ B. $yy_2 + y_1^2 = 0$

C. $y_2 - yy_1 = 0$ D. $y_2 + yy_1 = 0$

88. The elimination of the arbitrary constants $a$ and $b$ in $ax^2 + by^2 = 1$ leads to the D.E.

A. $y(y - xy') = 1$

B. $y(xy'' + y'^2) - xy' = 0$

C. $x(yy'' + y'^2) + yy' = 0$

D. $x(yy'' + y'^2) - yy' = 0$

89. If $\left(x - \frac{1}{x}\right) = 2i\sin\theta$ then $x^2 + \frac{1}{x^2}$ equals

A. $i\sin 2\theta$ B. $-2i\sin 2\theta$

90. If $\left(x+\frac{1}{x}\right)=2\cos\theta$ then $x^3+\frac{1}{x^3}$ equals:

A. $2\sin 3\theta$ B. $2\cos 3\theta$
C. $\cos^3\theta-3\cos\theta$ D. $8\cos^3\theta+3\cos\theta$

91. If $\alpha+\beta=45°$, then the value of $(\cot\alpha-1)(\cot\beta-1)$ is:

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

92. The value of

$$\sin\left(\frac{\pi}{14}\right)\sin\left(\frac{3\pi}{14}\right)\sin\left(\frac{5\pi}{14}\right)\sin\left(\frac{7\pi}{14}\right)$$ is:

A. 1 B. 1/4
C. 1/8 D. $\sqrt{2/7}$

93. If $\cot\alpha=1/3$ and $\tan\beta=1/2$, then the value of $(\alpha-\beta)$ is:

A. 0 B. $\pi/6$
C. $\pi/4$ D. $\pi/2$

94. For $l\neq m\neq n\neq 0$, the lines $lx+my+n=0$, $mx+ny+l=0$ and $nx+ly+m=0$ are concurrent if:

A. $l+m+n\neq 0$ B. $l+m+n=0$
C. $l-m-n=0$ D. $l+m-n=0$

95. The area (in square units) enclosed within the curve $|x|+|y|=1$, is:

A. 1 B. 2
C. 4 D. 8

96. The limit of

$$\left\{\cos\left(\frac{x}{2}\right)\cos\left(\frac{x}{2^2}\right)\cdots\cos\left(\frac{x}{2^n}\right)\right\}$$ as $n\to\infty$ is:

A. 0 B. 1
C. $(\sin x)/x$ D. none of these

97. The limit of $\left(\frac{\sin\theta-\cos\theta}{\theta-\pi/4}\right)$ as $\theta\to\pi/4$ is:

A. $\sqrt{2}$ B. $1/\sqrt{2}$
C. 0 D. 1

98. The limit of $\frac{(x-3)}{\left[\sqrt{x-2}-\sqrt{4-x}\right]}$ as $x\to 3$ is:

A. 0 B. 1
C. 2 D. none existent

99. If $f(x)=\left(\frac{\sin[x]}{[x]}\right)$, where $[x]$ denotes the greatest integer less than or equal to any real number $x$, then $\lim_{x\to 0} f(x)$ equals:

A. 1 B. 0
C. sin 1 D. none of these

100. The value of $a$ for which the function $f(x)=\begin{cases}x+1, & \text{if } x\leq 1\\ 3-ax^2, & \text{if } x>1\end{cases}$ is continuous at $x=1$, is equal to:

A. 0 B. $-1$
C. 1 D. 3

101. The coordinates of the point on the curve $y=x\log x$ at which the normal is parallel to the line $2x-2y+3=0$, are:

A. (0, 0) B. $(e, e)$
C. $(e^2, 2e^2)$ D. $(e^{-2}, -2e^{-2})$

102. If $f(x)=1+\alpha x$, $\alpha\neq 0$ is the inverse function of itself, then $\alpha$ equals:

A. $-2$ B. $-1$
C. 0 D. 2

103. If the function $f(x)=\cos^2 x+\cos^2\left(\frac{\pi}{3}+x\right)-\cos x\cos\left(\frac{\pi}{3}+x\right)$ is constant (independent of $x$), then the value of this constant is:

A. 0 B. 4/3
C. 3/4 D. 1

**104.** Of the following inverse trigonometric relations the only one that is independent of $x$ is:

A. $\sin^{-1} x + \tan^{-1} x$

B. $\tan^{-1} x + \tan^{-1}(1/x)$

C. $\sec^{-1} x + \text{cosec}^{-1}(1/x)$

D. $\cos^{-1} x + \cot^{-1} x$

**105.** The principal value of $\sin^{-1}(\sin 2\pi/3)$ is:

A. $\pi/3$ B. $2\pi/3$

C. $4\pi/3$ D. $2\pi$

**106.** If $\left(x + \frac{1}{x}\right) = 2$, then the principal value of $\sin^{-1} x$, is:

A. $\pi/6$ B. $\pi/4$

C. $\pi/2$ D. $3\pi/2$

**107.** The value of $\tan^{-1}\left(\frac{1}{2}\right) + \tan^{-1}(1/3)$ is:

A. $\tan^{-1}(5/6)$ B. 5/6

C. 1 D. $\pi/4$

**108.** The value of $\sec^2(\tan^{-1} 2) + \text{cosec}^2(\cot^{-1} 3)$ is:

A. 11/10 B. 45/4

C. $\sqrt{15}$ D. 15

**109.** For two matrices $A$ and $B$ of order $m \times n$ and $r \times p$ respectively, $AB$ exists if:

A. $m = p$ B. $m = r$

C. $n = p$ D. $n = r$

**110.** If $A = \begin{pmatrix} [illegible] & [illegible] \\ [illegible] & 4 \end{pmatrix}$ then $A^2$ equals:

A. $\begin{pmatrix} [illegible] & 10 \\ 15 & 22 \end{pmatrix}$ B. $\begin{pmatrix} 4 & 12 \\ 12 & 24 \end{pmatrix}$

C. $\begin{pmatrix} 1 & 4 \\ 9 & 16 \end{pmatrix}$ D. $\begin{pmatrix} 4 & 12 \\ 15 & 22 \end{pmatrix}$

**111.** If $A = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$, then $A^3 + 3A$ equals:

A. $A$ B. $3A$

C. $4A$ D. $6A$

**112.** If $A$ and $B$ are two square matrices of the same order, then $A$ and $B$ always satisfy:

A. $AB = BA$

B. $A(A + B) = A^2 + AB$

C. $(A + B)^2 = A^2 + 2AB + B^2$

D. $AB = 0 \Rightarrow$ Either $A = 0$ or $B = 0$

**113.** If (′) denotes the transpose of a matrix, then for any three square matrices $A$, $B$ and $C$ of the same order $(ABC)'$ is equal to:

A. $B'C'A'$ B. $C'A'B'$

C. $C'B'A'$ D. $A'B'C'$

**114.** If $f(x) = 2^{\sin x}$ on $(0, \pi)$, then the value of '$c$' in the Rolle's theorem is equal to:

A. $\pi/6$ B. $\pi/4$

C. $\pi/3$ D. $\pi/2$

**115.** The real number '$c$' guaranteed by the Rolle's theorem for $f(x) = \log_e \sin x$ in the interval $\left[\frac{\pi}{6}, \frac{5\pi}{6}\right]$, is:

A. $\pi/4$ B. $\pi/3$

C. $\pi/2$ D. $2\pi/3$

**116.** If $f(x) = \begin{cases} -1, & \text{for } x \le 0, \\ ax + b, & \text{for } 0 < x < 1, \\ 1, & \text{for } x \ge 1 \end{cases}$ is continuous for all $x$, then the values of $a$ and $b$ are:

A. $a = 2$ and $b = -1$

B. $a = 2$ and $b = 1$

C. $a = -1$ and $b = -1$

D. $a = 1$ and $b = 1$

117. The function $f(x) = \left\{\frac{\log(1+ax) - \log(1-bx)}{x}\right\}$ is not defined at $x = 0$. The value which should be assigned to $f$ at $x = 0$ so that it is continuous at $x = 0$, is:

A. $(a - b)$ B. $(a + b)$
C. $\log (ab)$ D. $\log (a/b)$

118. If $f(x) = |x|$, then $f'(0)$ is:

A. $-1$ B. 0
C. 1 D. non existent

119. The largest interval on which the function $f(x) = \frac{-x}{(1+|x|)}$ is differentiable is:

A. $(-\infty, 0)$ B. $(0, \infty)$
C. $(-\infty, \infty)$ D. $(-\infty, 0) \cup (0, \infty)$

120. The limit of $\left(\frac{\sin x^{n}}{x}\right)$ as $x \to 0$, is:

A. 1 B. $\pi$
C. $180/\pi$ D. $\pi/180$

121. The limit of $\left(\frac{\sin x - x}{x^3}\right)$ as $x \to 0$, is:

A. 1/3 B. $-1/3$
C. 1/6 D. $-1/6$

122. The limit of $(\Sigma n)/(1 - n^2)$ as $n \to \infty$, is:

A. 0 B. $-$
C. 1/2 D. none of these

123. The slope of a curve $y = f(x)$ is $\sin^2 x$. If the curve passes through the origin, its equation is:

A. $y = x - \sin x \cos x$
B. $y = x + \sin x \cos x$
C. $2y = x - \sin x \cos x$
D. $2y = x + \sin x \cos x$

124. The curve through the point (2, 1) for which the tangent at any point coincides with the direction of the radius vector drawn from the origin to that point is:

A. $2y = x$ B. $4y = x^2$
C. $2y^2 = x$ D. $4y^2 = -x^2$

125. The curve through the point (2, 1) for which the slope of the tangent at any point is twice the slope of the straight line connecting this point with the origin, is

A. $4y = x^2$ B. $y = 2x - 3$
C. $y = xe^x + 1 - 2e^2$ D. $y = (\log x)/(\log 2)$

126. The equation of the curve through the point (2, 3) and having the property that the segment of any tangent to it, lying between the coordinate axes, is bisected by the point of contact is:

A. $x^2 + y^2 = 13$ B. $2y = 3x$
C. $3x^3 = 4y$ D. $xy = 6$

127. The greatest value of non-negative $\lambda$ such that the equations $2x^2 + 9x - \lambda + 8 = 0$ and $x^2 - 8x + \lambda + 4 = 0$ have both real roots, is:

A. 9 B. 12
C. 15 D. 16

128. Solution of $\frac{d^2y}{dx^2} + y = 0$ is :

A. $y = A \cos x + B \sin x$
B. $y = Ae^x + Be^{-x}$
C. $y = A \cos x + B \cos^2 x$
D. $y = Ae^x + B$

129. The general solution of the D.E. $\log\left(\frac{dy}{dx}\right) = x + y$, is:

A. $e^x + e^y = c$ B. $e^x + e^{-y} = c$
C. $e^{-x} + e^y = c$ D. $e^{-x} + e^{-y} = c$

130. A particular solution of the D.E. $y' + y^2 = 1$, is:

A. $y = \sin x$ B. $y = x^2$
C. $4y = x^3 + 1$ D. none of these

131. The general solution of the D.E. $(x - xy^2)\, dx + (y - x^2y)\, dy = 0$, is:

A. $x^2 + y^2 = c$
B. $(1 - x^2) = c\,(1 + y^2)$

C. $x^2 - y^2 = x^2y^2 = c$

D. $x^2 + y^2 = x^2y^2 + c$

132. The general solution of the D.E. $(x + y)\,dx + x\,dy = 0$ is:

A. $x^2 + y^2 + x = c$ B. $y^2 + 2xy = c$

C. $y^2 + 2xy = c$ D. $y^2 + 2x^2 = c$

133. The general solution of the D.E. $xy'' = y'$, is:

A. $y = c_1x^3 + c_2$

B. $y = c_1x^3 + c_2x^2$

C. $y = c_1e^x + c_2 - x - \frac{x^2}{2}$

D. $y = \frac{1}{3}x^3 + c_1x^2 + c_2$

134. The general solution of the D.E.

$$\frac{dy}{dx} + \sin\left(\frac{x+y}{2}\right) - \sin\left(\frac{x-y}{2}\right) \text{ is:}$$

A. log tan $(y/2) = c - 2 \sin x$

B. log tan $(y/4) = c - 2 \sin (x/2)$

C. log tan $(y/2 + \pi/4) = c - 2 \sin x$

D. log tan $(y/4 + \pi/4) = c - 2 \sin (x/2)$

135. If the product of the roots of the equation $\frac{1}{(x+a)} + \frac{1}{(x+b)} + \frac{1}{(x+c)}$ is zero, then the sum of its roots is:

A. 0 B. $2ab/(b + c)$

C. $2bc/(b + c)$ D. $-2bc/(b + c)$

136. The value of $\int_{1/\pi}^{1/\pi} \frac{\sin(1/x)}{x^2}dx$ is:

A. 0 B. $-1$

C. 1 D. none of these

137. The value of $\int_1 ... - x\,dx$ is:

A. 0 B. $-1/2$

C. 1/2 D. 5/2

138. The value of $\int_{-1}^{1}(2|x|-|x|^3)dx$ is:

A. 0 B. 3/4

C. 3/2 D. 3

139. The area bounded by the curve $y = x^3$ the $x$-axis, and the ordinates at $x = -2$ and $x = 1$ is:

A. $-9$ B. $-15/4$

C. 15/4 D. 17/4

140. The area bounded by the curve $x = 4y - y^2$ and the $y$-axis, is:

A. 32/3 B. 64/3

C. 32 D. 64

141. If $f(x) = \int_0^x t \sin t\,dt$ then $f'(x)\,dx$ equals:

A. $x \sin x$

B. $x \sin x + x$

C. $(x - 1) \sin x$ ... $\cos x$

D. $(1 - x) \sin x$ ... $\cos x$

142. The value of $\int ... \sqrt{1 + \sin x/2}\,dx$ is:

A. ... B. 0

C. ... D. 8

143. The value of $\int_{\pi/6}^{\pi/3} \frac{dx}{\sin 2x}$ is:

A. 0 B. 1/2 log 3

C. log 3 D. 2 log 3

144. The value of $\int_0^2 \sqrt{\left(\frac{2+x}{2-x}\right)}$ is:

A. $1/2(\pi+2)$ B. $1/4(\pi+2)$

C. $(\pi+1)$ D. $(\pi+2)$

145. If $p$, $q$ are integers, then $\int_{-\pi}^{\pi}(\cos px - \sin qx)^2 dx$ equals:

A. 0 B. $-\pi$

C. $\pi$ D. $2\pi$

146. If $f'(2) = 4$, $f'(1) = 2$, then the value of $\int_1^2 f'(x) f''(x) dx$ is:

A. 2
B. 6
C. 8
D. 12

147. The multiplicative inverse of $\begin{pmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{pmatrix}$ is:

A. $\begin{pmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{pmatrix}$

B. $\begin{pmatrix} -\cos\theta & \sin\theta \\ -\sin\theta & -\cos\theta \end{pmatrix}$

C. $\begin{pmatrix} \cos\theta & \sin\theta \\ \sin\theta & -\cos\theta \end{pmatrix}$

D. $\begin{pmatrix} -\cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{pmatrix}$

148. The multiplicative inverse of $\begin{pmatrix} i & -i \\ i & i \end{pmatrix}$ is:

A. $2\begin{pmatrix} -i & -i \\ i & -i \end{pmatrix}$
B. $\frac{1}{2}\begin{pmatrix} -i & -i \\ i & -i \end{pmatrix}$

C. $\frac{1}{2}\begin{pmatrix} -i & i \\ -i & -i \end{pmatrix}$
D. $2\begin{pmatrix} -i & i \\ -i & -i \end{pmatrix}$

149. If $\omega$ is a complex cube root of unity, then $\begin{pmatrix} \omega & \omega^2 \\ \omega & \omega \end{pmatrix}\begin{pmatrix} \omega & \omega^2 \\ 1 & \omega^2 \end{pmatrix}$ equals:

A. $\begin{pmatrix} -1 & -1 \\ -1 & 2 \end{pmatrix}$
B. [illegible]

C. $\begin{pmatrix} 1 & -1 \\ -1 & 2 \end{pmatrix}$
D. $\begin{pmatrix} -1 & -1 \\ -1 & -2 \end{pmatrix}$

150. If A = [illegible], then the correct statement is:

A. $A^2 = 0$
B. $A^3 = 0$
C. $A^2 = I$
D. $A^3 = I$

151. The area of the region lying above the $x$-axis and beneath the graph of the function $f(x) = \begin{cases} x^2, 0 \le x < 1, \\ 4 - x^2, 1 \le x \le 2 \end{cases}$ is equal to:

A. 1/3
B. 5/3
C. 2
D. 9

152. The area in square units bounded by the curve $x^2 = 4y$ and the line $x = 4y - 2$ is:

A. 1/2
B. 2/3
C. 8/9
D. 9/8

153. For any 2 x 2 matrix, $A$, if $A(\text{adj } A) = \begin{pmatrix} 5 & 0 \\ 0 & 5 \end{pmatrix}$, then det $A$ equals:

A. 0
B. 5
C. 10
D. 25

154. For a non-singular matrix $A$ of order $n$, if $|A|$ denotes the determinants of $A$, then $|A|$ adj $A|$ equals:

A. $|A|^2$
B. $|A|^{n-1}$
C. [illegible]
D. none of these

155. If $A = \begin{pmatrix} a & 0 & 0 \\ 0 & a & 0 \\ 0 & 0 & a \end{pmatrix}$, then $|A|$ adj $A|$ is equal to:

A. $a^3$
B. $a^6$
C. $a^9$
D. $a^{27}$

156. The multiplicative inverse of $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$ is equal to:

A. $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$
B. $\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$

C. $\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$
D. $\begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}$

157. One of the roots of the equation $5x^2 + 13x + k$

= 0 is reciprocal of the other if $k$ equals:

A. 0 B. 5

C. 6 D. −5

**158.** The quadratic equation whose roots are twice the reciprocals of the roots of the equation $ax^2 + 2bx + 4c = 0$, is:

A. $cx^2 + bx + a = 0$

B. $ax^2 + bx + c = 0$

C. $ax^2 + 4bx + 16c = 0$

D. $4cx^2 + 2bx + a = 0$

**159.** The maximum of the objective function $f(x, y) = 5x + 3y$, subject to the constraints $x \geq 0$, $y \geq 0$ and $5x + 2y \leq 10$, is:

A. 6 B. 10

C. 15 D. 25

**160.** In a box containing 100 bulbs, 10 are defective. The probability that out of a sample of 5 bulbs, none is defective, is:

A. $10^{-5}$ B. $1/2^5$

C. 9/10 D. $(9/10)^5$

**161.** A fair dice is tossed 180 times, the S.D. of the number of sixes is:

A. $\sqrt{30}$ B. 30

C. 5 D. 25

**162.** The parameters $n$ and $p$ of a B.[illegible] [illegible] 16 [illegible] 1/2 respectively. Its S.D. $\sigma$ is [illegible] to:

A. $\sqrt{2}$ B. 2

C. $2\sqrt{2}$

**163.** If the mean and [illegible] of a Binomial variable $X$ are 2 [illegible] respectively, then the probability that $X$ [illegible] value greater than 1 is:

A. 1/16 B. 5/16

C. [illegible] D. 15/16

**164.** [illegible] hundred cards are numbered 1 to 100. The probability that a randomly chosen card has the digit 5, is:

A. 0.01 B. 0.10

C. 0.18 D. 0.19

**165.** The probability that a non-leap year (365 days) should have 53 Sundays, is:

A. 1/7 B. 2/7

C. 6/7 D. 53/365

**166.** The probability of a leap-year (366 days) having 53 Sundays, is:

A. 1/7 B. 2/7

C. 3/7 D. 53/366

**167.** The probability of hitting a target [illegible] gun is 7/10, and from another gun i[illegible]/10. [illegible] target will be destroyed if at least o[illegible] the guns makes a hit. The prob[illegible] of destroying the target in a simul[illegible] firing from both guns is:

A. 46/100 B. [illegible]/100

C. 94/100 D. None of these

**168.** If $x = 2 +$ [illegible] then the value of $x^3 - 6x^2 + 6x$ is:

A. [illegible] B. 2

C. 3 D. none of these

**16[illegible].** The [illegible]omplete solution of the inequation $x^2 - 2x - 8 < 0$ is:

A. $-2 < x < 2$ B. $-2 < x < 4$

C. $-4 < x < 4$ D. $2 < x < 4$

**170.** If $P(A)$ denotes the probability of an event $A$, then which of the following assertions is always true?

A. $P(A) < 0$ B. $P(A) \geq 1$

C. $0 \leq P(A) \leq 1$ D. $-1 \leq P(A) \leq 1$

**171.** Two fair dice are tossed. Let $A$ be the event that the first die shows an even number and $B$ be the event that the second die shows an odd number. Then the two events $A$ and $B$ are:

A. mutually exclusive

B. dependent

C. independent

D. mutually exclusive and independent

**172.** If $A$, $B$ are any two independent events in a sample space then $P(A$ or $B)$ equals:

A. $P(A) + P(B)$ B. $P(A) \cdot P(B)$

C. $1 - P(A)\,P(B)$  D. $1 - P(\bar{A})\,P(\bar{B})$

**173.** If $A$ and $B$ are independent events, then $P(A$ and $B)$ is:

A. $P(A)\,P(B)$  B. $P(A) + P(B)$

C. $P(A/B)$  D. $P(B/A)$

**174.** The probabilities of two events $A$ and $B$ are 0.3 and 0.6 respectively. The probability that both $A$ and $B$ occur simultaneously is 0.18. Then the probability that neither $A$ nor $B$:

A. 0.10  B. 0.28

C. 0.42  D. 0.72

**175.** Let $f: R \to R, f(x) = 2x + 3$, then $f^{-1}(0)$ equals:

A. 3/2  B. −3/2

C. 1/3  D. −1/3

**176.** Let $f: R - \{-1\} \to R, f(x) = \frac{x}{(1+x)}$, then $f^{-1}(x)$ equals:

A. $(1 + x)/x$  B. $(1 - x)/x$

C. $x/(1 - x)$  D. $x/(1 + x)$

**177.** The inverse of the function $f(x) = \frac{ax-b}{cx-a}$, $x \neq \frac{a}{c}$ is:

A. $y = (ax - b)/(cx - a)$

B. $y = (cx - a)/(ax - b)$

C. $y = (cx - b)/(bx - a)$

D. $y = (bx - a)/(cx - b)$

**178.** The inverse of the function $f(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}} + 1$, is:

A. $y = 2\log\{x/(2 - x)\}$

B. $y = \frac{1}{2}\log\{x/(2 - x)\}$

C. $y = \frac{1}{2}(e^{2x} + e^{-2x})$

D. $y = -1 + (e^x + e^{-x})/(e^x - e^{-x})$

**179.** If $2f(x) - 3f(1/x) = x^2, x \neq 0$ then $f(2)$ equals:

A. 4/5  B. 5/4

C. −5/2  D. −7/4

**180.** The period of the function

$f(x) = \sin\frac{\pi x}{3} + \sin\frac{\pi x}{4}$ is:

A. 14  B. 12

C. 24  D. none of these

**181.** If one root of the equation $x^2 = px + q$ is reciprocal of the other, then:

A. $q = -1$  B. $q = 1$

C. $pq = -1$  D. $pq = 1$

**182.** For $-1 \le x \le [x] + x$ equals:

A. $x$  B. $2x$

C. $x + 1$  D. [illegible]

**183.** If $f(x) = e^{-x}$, then $f(-a)f(b)$ equals:

A. $f(-a + b)$  B. $f(a - b)$

C. $f(a + b)$  D. $f(-a - b)$

**184.** If $f(x) = \log\left(\frac{1+x}{1-x}\right)$, $x < 1$, then $f\left(\frac{2x}{1+x^2}\right)$ equals:

A. $f(x)$  B. $f(1/x)$

C. $2f(x)$  D. $2f(1/x)$

**185.** If $f(x) = (1 - x)^{-1}$, then $f(f(x))$ equals:

A. $x$  B. $(1 - x)^{-4}$

C. $x/(x - 1)$  D. $(x - 1)/x$

**186.** If $N$ is the set of natural numbers then the function $f: N \to N$ defined by $f(n) = 2n + 3$, is:

A. injective  B. surjective

C. bijective  D. none of these

**187.** The composite function $(f \circ g)(x)$ of the functions $f: R \to R, f(x) = \sin x$, and $g: R \to R$, $g(x) = x^2$, is:

A. $\sin^2 x$  B. $\sin (x)^2$

C. $x^2 \sin x$  D. $\sin^2 (x^2)$

**188.** If one root of the equation $ax^2 + bx + c = 0$ is $n$ times the other, then:

A. $nb^2c = a(n + 1)^2$

B. $nb^2a = c(n+1)^2$

C. $nb^2 = ac(n+1)^2$

D. $4nb^2 = c(n+1)^2$

**189.** If $p$ and $q$ are the roots of the equation $x^2 + bx + c = 0$, then the roots of the equation $x^2 - (p + q + pq)x + pq(p + q) = 0$, are:

A. $b$ and $c$ B. $-b$ and $c$

C. $b$ and $-c$ D. $-b$ and $-c$

**190.** The value of cos 105° + sin 105° is:

A. 0 B. $\sqrt{(3/2)}$

C. $1/\sqrt{2}$ D. $(\sqrt{3}+1)/2$

**191.** The value of sin (67½°) sin (22½°) is:

A. $-1/2\sqrt{2}$ B. $1/2\sqrt{2}$

C. $2\sqrt{2}$ D. $-2\sqrt{2}$

**192.** The value of

$$\left(1+\cos\frac{\pi}{8}\right)\left(1+\cos\frac{3\pi}{8}\right)\left(1+\cos\frac{5\pi}{8}\right)\left(1+\cos\frac{7\pi}{8}\right)$$

is:

A. 1/2 B. 1/4

C. 1/8 D. 1/16

**193.** The value of $\sin^2\frac{2\pi}{15} - \sin^2\frac{\pi}{30}$ is:

A. $(\sqrt{5}-1)/4$ B. $(\sqrt{5}-1)/8$

C. $(\sqrt{5}+1)/\sqrt{3/2}$ D. $(\sqrt{5}-1)/\sqrt{3/2}$

**194.** The value of sin 50° – sin 70° + sin 10° is:

A. 0 B. 1

C. 2 D. none of these

**195.** The locus of the point whose distance from the origin exceeds its distance from the positive *x*-*axis* by 1 unit, is:

A. $x^2 - 2y = 1$ B. $x^2 + 2y = 1$

C. $y^2 - 2x = 1$ D. $y^2 + 2x = 1$

**196.** The orthocentre of the triangle formed by the line $bx + ay = ab$ and the coordinate axes, is:

A. (0, 0) B. $(a, b)$

C. $(a/3, b/3)$ D. $(a/2, b/2)$

**197.** A regular polygon has 23 sides. The number of additional lines need to be drawn so that every pair of vertices may be connected is equal to:

A. 230 B. 253

C. 460 D. 506

**198.** When simplified, the expression

$^{47}C_4 + \sum_{n=1}^{5} {}^{(52-n)}C_3$ equals:

A. $^{47}C_5$ B. $^{49}C_4$

C. $^{52}C_5$ D. $^{52}C_4$

**199.** If the three successive coefficients in the Binomial expansion of $(1 + x)^n$ are 28, 56 and 70 respectively, then $n$ equals:

A. 4 B. 6

C. 8 D. 10

**200.** The coefficient of $x^{99}$ in the polynomial $(x-1)(x-2)(x-3)\ldots\ldots(x-100)$ is equal to:

A. 100! B. –(99)!

C. 99! D. –5050

**201.** The Binomial expansion of $(1-2x)^{-1/3} + (1+3x)^{1/2}$ is valid in the range:

A. $-\frac{1}{2} < x < \frac{1}{2}$ B. $-\frac{1}{3} < x < \frac{1}{3}$

C. $-2 < x < 3$ D. $-1 < x < 1$

**202.** For $a > 1$, the complete solution of the inequation $\log_a x + \log_a (x+1) < \log_a (2x+6)$, is:

A. $0 < x < 2$ B. $0 < x < 3$

C. $-2 < x < 3$ D. $-3 < x < 2$

# ANSWERS

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| D | A | B | A | C | C | C | D | D | D |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| A | B | A | A | D | C | A | A | C | B |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| A | C | D | A | C | A | C | D | A | B |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| D | C | C | D | B | A | B | A | B | C |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| A | B | D | B | B | A | A | B | C | A |
| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| D | B | C | B | A | B | A | C | B | [illegible] |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
| C | B | D | B | D | D | A | C | B | C |
| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| B | D | A | D | B | D | D | C | B | A |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| C | B | C | B | D | B | A | B | C | B |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| B | C | C | B | B | C | A | D | D | C |
| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 |
| D | B | C | B | A | C | D | D | D | A |
| 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 |
| C | B | C | D | C | C | B | D | C | D |
| 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 |
| D | B | C | A | [illegible] | D | B | A | B | C |
| 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140 |
| D | B | A | B | D | C | C | C | D | C |
| 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148 | 149 | 150 |
| A | D | B | D | D | B | A | D | A | B |
| 151 | 152 | 153 | 154 | 155 | 156 | 157 | 158 | 159 | 160 |
| A | D | B | C | C | A | B | A | C | D |
| 161 | 162 | 163 | 164 | 165 | 166 | 167 | 168 | 169 | 170 |
| C | B | C | A | A | B | C | B | B | C |
| 171 | 172 | 173 | 174 | 175 | 176 | 177 | 178 | 179 | 180 |
| C | D | A | B | B | C | A | B | D | C |
| 181 | 182 | 183 | 184 | 185 | 186 | 187 | 188 | 189 | 190 |
| [illegible] | D | D | C | A | A | B | C | B | C |
| 191 | 192 | 193 | 194 | 195 | 196 | 197 | 198 | 199 | 200 |
| B | C | B | A | A | A | A | D | C | D |
| 201 | 202 | | | | | | | | |
| B | B | | | | | | | | |