101. If var $(x) = 8.25$, var $(y) = 33.96$ and $\text{cov}(x, y) = 10.2$, then the correlation coefficient is

(a) 0.89 (b) -0.98
(c) 0.61 (d) -0.16

102. If the standard deviation of a variable x is σ, then the standard deviation of another variable $\frac{ax+b}{c}$ is

(a) $\frac{\sigma a+b}{c}$ (b) $\frac{a\sigma}{c}$
(c) σ (d) None of these

103. If $\Sigma x = 15$, $\Sigma y = 36$, $\Sigma xy = 110$, $n = 5$, then cov (x, y) equals

(a) $\frac{1}{5}$ (b) $-\frac{1}{5}$
(c) $\frac{2}{5}$ (d) $-\frac{2}{5}$

104. The two lines of regression are given by $3x + 2y = 26$ and $6x + y = 31$. The coefficient of correlation between x and y is

(a) $-\frac{1}{3}$ (b) $\frac{1}{3}$
(c) $-\frac{1}{2}$ (d) $\frac{1}{2}$

105. The AM of 4, 7, y and 9 is 7. Then, the value of y is

(a) 8 (b) 10
(c) 28 (d) 0

106. The median from the table

Value	7	8	10	9	11	12	13
Frequency	2	1	4	5	6	1	3

is

(a) 100 (b) 10
(c) 110 (d) 1110

107. The mode of the following series 3, 4, 2, 1, 7, 6, 6, 8, 9, 5 is

(a) 5 (b) 6
(c) 7 (d) 8

108. The median of the data, weight (in kg) 54, 50, 40, 42, 51, 45, 47, 55, 57 is

(a) 50 kg (b) 55 kg
(c) 52 kg (d) 54 kg

109. The SD of the given data

Class interval	0–10	10–20	20–30	30–40	40–50
Frequency	2	10	8	4	6

is

(a) 12 (b) 12.36
(c) 12.40 (d) 13.05

110. There are n letters and n addressed envelopes, the probability that all the letters are not kept in the right envelope, is

(a) $\frac{1}{n!}$ (b) $1-\frac{1}{n!}$

(c) $1-\frac{1}{n}$ (d) $n!$

111. If A and B are two events such that $P(A) \neq 0$ and $P(B) \neq 1$, then $P\left(\frac{\overline{A}}{\overline{B}}\right)$ is equal to

(a) $1-P\left(\frac{A}{B}\right)$ (b) $1-P\left(\frac{\overline{A}}{B}\right)$

(c) $\frac{1-P(A \cup B)}{P(\overline{B})}$ (d) $\frac{P(\overline{A})}{P(B)}$

112. A coin is tossed 3 times, the probability of getting exactly two heads, is

(a) $\frac{3}{8}$ (b) $\frac{1}{2}$

(c) $\frac{1}{4}$ (d) None of these

113. Six boys and six girls sit in a row, the probability that the boys and girls sit alternatively, is

(a) $\frac{1}{462}$ (b) $\frac{1}{924}$

(c) $\frac{1}{2}$ (d) None of these

114. If A and B are two independent events such that $P(A \cap \overline{B}) = \frac{3}{25}$ and $P(A \cap B) = \frac{8}{25}$, then $P(A)$ is equal to

(a) $\frac{11}{25}$ (b) $\frac{3}{8}$

(c) $\frac{2}{5}$ (d) $\frac{4}{5}$

115. In a college of 300 students every student read 5 newspapers and every newspaper is read by 60 students. The number of newspaper is

(a) atleast 30 (b) atmost 20

(c) exactly 25 (d) None of these

116. $\int \sqrt{\frac{1-x}{1+x}}\, dx$ is equal to

(a) $\sin^{-1} x - \frac{1}{2}\sqrt{1-x^2} + c$

(b) $\sin^{-1} x + \frac{1}{2}\sqrt{1-x^2} + c$

(c) $\sin^{-1} x - \sqrt{1-x^2} + c$

(d) $\sin^{-1} x + \sqrt{1-x^2} + c$

117. $\int \frac{x-1}{(x+1)^3} e^x\, dx$ is equal to

(a) $\frac{-e^x}{(x+1)^2} + c$ (b) $\frac{e^x}{(x+1)^2} + c$

(c) $\frac{e^x}{(x+1)^3} + c$ (d) $\frac{-e^x}{(x+1)^3} + c$

118. $\int \frac{1}{x^2 (x^4+1)^{3/4}}\, dx$ is equal to

(a) $\frac{(x^4+1)^{1/4}}{x} + c$

(b) $-\frac{(x^4+1)^{1/4}}{x} + c$

(c) $\frac{3}{4}\frac{(x^4+1)^{3/4}}{x} + c$

(d) $\frac{4}{3}\frac{(x^4+1)^{3/4}}{x} + c$

119. If $y = \cos(\sin x^2)$, then at $x = \sqrt{\frac{\pi}{2}}$, $\frac{dy}{dx}$ is equal to

(a) -2 (b) 2

(c) $-2\sqrt{\frac{\pi}{2}}$ (d) 0

120. If

$y = \sqrt{\log x + \sqrt{\log x + \sqrt{\log x + \sqrt{\log x + \ldots \infty}}}}$

then $\frac{dy}{dx}$ is equal to

(a) $\frac{x}{2y-1}$ (b) $\frac{x}{2y+1}$

(c) $\frac{1}{x(2y-1)}$ (d) $\frac{1}{x(1-2y)}$

121. If $f(x+y) = f(x) \cdot f(y)$ for all x and y and $f(5) = 2$, $f'(0) = 3$, then $f'(5)$ will be

(a) 2 (b) 4

(c) 6 (d) 8

122. On the interval [0, 1] the function $x^{25}(1-x)$ takes its maximum value at the point

(a) 9 (b) 1/2

(c) 1/3 (d) 1/4

123. If $ax^2 + 2hxy + by^2 = 1$, then $\frac{d^2y}{dx^2}$ is equal to

(a) $\frac{h^2+ab}{(hx+by)^3}$ (b) $\frac{h^2-ab}{(hx+by)^2}$

(c) $\frac{h^2+ab}{(hx+by)^2}$ (d) $\frac{h^2-ab}{(hx+by)^3}$

124. The first derivative of the function $\left[\cos^{-1}\left(\sin\frac{\sqrt{1+x}}{2}\right)+x^x\right]$ w.r.t. x at $x=1$ is
(a) $\frac{3}{4}$ (b) $-\frac{1}{4\sqrt{2}}+1$
(c) $\frac{1}{2}$ (d) $-\frac{1}{2}$

125. Function $f(x)=2x^3-9x^2+12x+99$ is monotonically decreasing when
(a) $x<2$ (b) $x>2$
(c) $x>1$ (d) $1<x<2$

126. If $f(x)=\frac{x}{\sin x}$ and $g(x)=\frac{x}{\tan x}$, where $0<x\le 1$, then in this interval
(a) both $f(x)$ and $g(x)$ are increasing function
(b) both $f(x)$ and $g(x)$ are decreasing function
(c) $f(x)$ is an increasing function
(d) $g(x)$ is an increasing function

127. If $f(x)=\begin{cases} x\sin\frac{1}{x}, & x\ne 0 \\ 0, & x=0 \end{cases}$, then $\lim_{x\to 0} f(x)$ is equal to
(a) 1 (b) 0
(c) -1 (d) None of these

128. The function
$f(x)=\frac{\log(1+ax)-\log(1-bx)}{x}$ is not defined at $x=0$, the value of 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) $\log a+\log b$ (d) $\log a-\log b$

129. Domain of the function $f(x)=\sqrt{2-2x-x^2}$ is
(a) $-\sqrt{3}\le x\le +\sqrt{3}$
(b) $-1-\sqrt{3}\le x\le -1+\sqrt{3}$
(c) $-2\le x\le 2$
(d) $-2+\sqrt{3}\le x\le -2-\sqrt{3}$

130. The function $f(x)=[x]\cos\left[\frac{2x-1}{2}\right]\pi$ where [·] denotes the greatest integer function, is discontinuous at
(a) all x
(b) no x
(c) all integer points
(d) x which is not an integer

131. If the function,
$$f(x)=\begin{cases} x+a^2\sqrt{2}\sin x, & 0\le x<\frac{\pi}{4} \\ x\cot x+b, & \frac{\pi}{4}\le x\le\frac{\pi}{2} \\ b\sin 2x-a\cos 2x, & \frac{\pi}{2}\le x\le\pi \end{cases}$$
is continuous in the interval $[0,\pi]$, then the values of (a,b) are
(a) $(-1,-1)$ (b) $(0,0)$
(c) $(-1,1)$ (d) $(1,0)$

132. $\vec{\mathbf{a}}\cdot\{(\vec{\mathbf{b}}+\vec{\mathbf{c}})\times(\vec{\mathbf{a}}+\vec{\mathbf{b}}+\vec{\mathbf{c}})\}$ is equal to
(a) 0 (b) $[abc]+[bca]$
(c) $[abc]$ (d) None of these

133. The number of vectors of unit length perpendicular to vectors $\vec{\mathbf{a}}=(1,1,0)$ and $\vec{\mathbf{b}}=(0,1,1)$ is
(a) three (b) one
(c) two (d) ∞

134. The points with position vectors $40\hat{\mathbf{i}}-8\hat{\mathbf{j}}$, $a\hat{\mathbf{i}}-52\hat{\mathbf{j}}$ are collinear, if a is equal to
(a) -40 (b) 260
(c) 20 (d) -20

135. If $\vec{\mathbf{a}}=4\hat{\mathbf{i}}+6\hat{\mathbf{j}}$ and $\vec{\mathbf{b}}=3\hat{\mathbf{j}}+4\hat{\mathbf{k}}$, then the component of $\vec{\mathbf{a}}$ along $\vec{\mathbf{b}}$ is
(a) $\frac{18}{10\sqrt{3}}(3\hat{\mathbf{j}}+4\hat{\mathbf{k}})$
(b) $\frac{18}{25}(3\hat{\mathbf{j}}+4\hat{\mathbf{k}})$
(c) $\frac{18}{\sqrt{3}}(3\hat{\mathbf{j}}+4\hat{\mathbf{k}})$
(d) $3\hat{\mathbf{j}}+4\hat{\mathbf{k}}$

136. The unit vector perpendicular to the vectors $6\hat{\mathbf{i}}+2\hat{\mathbf{j}}+3\hat{\mathbf{k}}$ and $3\hat{\mathbf{i}}-6\hat{\mathbf{j}}-2\hat{\mathbf{k}}$ is
(a) $\frac{2\hat{\mathbf{i}}-3\hat{\mathbf{j}}+6\hat{\mathbf{k}}}{7}$ (b) $\frac{2\hat{\mathbf{i}}-3\hat{\mathbf{j}}-6\hat{\mathbf{k}}}{7}$
(c) $\frac{2\hat{\mathbf{i}}+3\hat{\mathbf{j}}-6\hat{\mathbf{k}}}{7}$ (d) $\frac{2\hat{\mathbf{i}}+3\hat{\mathbf{j}}+6\hat{\mathbf{k}}}{7}$

137. A unit vector $\vec{\mathbf{a}}$ makes an angle $\frac{\pi}{4}$ with z-axis, if $\vec{\mathbf{a}}+\hat{\mathbf{i}}+\hat{\mathbf{j}}$ is a unit vector, then $\vec{\mathbf{a}}$ is equal to

(a) $\frac{\hat{i}}{2}+\frac{\hat{j}}{2}+\frac{\hat{k}}{2}$ (b) $\frac{\hat{i}}{2}+\frac{\hat{j}}{2}-\frac{\hat{k}}{\sqrt{2}}$

(c) $-\frac{\hat{i}}{2}-\frac{\hat{j}}{2}+\frac{\hat{k}}{\sqrt{2}}$ (d) $\frac{\hat{i}}{2}-\frac{\hat{j}}{2}-\frac{\hat{k}}{\sqrt{2}}$

138. If $\overrightarrow{AO}+\overrightarrow{OB}=\overrightarrow{BO}+\overrightarrow{OC}$, then A, B, C form

(a) equilateral triangle
(b) right angled triangle
(c) isosceles triangle
(d) line

139. The area of a parallelogram whose adjacent sides are $\hat{i}-2\hat{j}+3\hat{k}$ and $2\hat{i}+\hat{j}-4\hat{k}$, is

(a) $5\sqrt{3}$ sq unit (b) $10\sqrt{3}$ sq unit
(c) $5\sqrt{6}$ sq unit (d) $10\sqrt{6}$ sq unit

140. The sum of the first n terms of the series $\frac{1}{2}+\frac{3}{4}+\frac{7}{8}+\frac{15}{16}+\dots$ is

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

141. If the first and $(2n-1)$th terms of an AP, GP and HP are equal and their nth terms are respectively a, b and c, then

(a) $a\ge b\ge c$ (b) $a\ne c=b$
(c) $ac-b^2=0$ (d) Both (a) and (c)

142. If $a_1, a_2, a_3, \dots, a_n$ are in HP, then $a_1a_2+a_2a_3+\dots+a_{n-1}a_n$ will be equal to

(a) a_1a_n (b) na_1a_n
(c) $(n-1)a_1a_n$ (d) None of these

143. The sum of n terms of the following series $1+(1+x)+(1+x+x^2)+\dots$ will be

(a) $\frac{1-x^n}{1-x}$

(b) $\frac{x(1-x^n)}{1-x}$

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

(d) None of the above

144. If $S_n=nP+\frac{1}{2}n(n-1)Q$, where S_n denotes the sum of the first n terms of an AP, then the common difference is

(a) $P+Q$ (b) $2P+3Q$
(c) $2Q$ (d) Q

145. The sum of the series $2^2+4^2+6^2+\dots+(2n)^2$ is equal to

(a) $\frac{2}{3}(n+1)(2n)$
(b) $\frac{2}{3}n(n+1)(2n+1)$
(c) $\frac{2}{3}n(n-1)$
(d) None of the above

146. If $P=(1, 0)$, $Q=(-1, 0)$ and $R=(2, 0)$ are three given points, then the locus of a point S satisfying the relation $SQ^2+SR^2=2SP^2$ is

(a) a straight line parallel to x-axis
(b) a circle through origin
(c) a circle with centre at the origin
(d) a straight line parallel to y-axis

147. If the vertices of a triangle be (2, 1), (5, 2) and (3, 4), then its circumcentre is

(a) $\left(\frac{13}{2},\frac{9}{2}\right)$ (b) $\left(\frac{13}{4},\frac{9}{4}\right)$
(c) $\left(\frac{9}{4},\frac{13}{4}\right)$ (d) None of these

148. The line $x+y=4$ divides the line joining the points $(-1, 1)$ and $(5, 7)$ in the ratio

(a) 2 : 1 (b) 1 : 2
(c) 2 : 3 (d) None of these

149. Given the points $A(0, 4)$ and $B(0, -4)$, then the equation of the locus of the point $P(x, y)$ such that, $|AP-BP|=6$, is

(a) $\frac{x^2}{7}+\frac{y^2}{9}=1$ (b) $\frac{x^2}{9}+\frac{y^2}{7}=1$
(c) $\frac{x^2}{7}-\frac{y^2}{9}=1$ (d) $\frac{y^2}{9}-\frac{x^2}{7}=1$

150. If $P(1, 2)$, $Q(4, 6)$, $R(5, 7)$ and $S(a, b)$ are the vertices of a parallelogram $PQRS$, then

(a) $a=2, b=4$ (b) $a=b, b=4$
(c) $a=2, b=3$ (d) $a=3, b=5$

151. The incentre of the triangle formed by (0, 0), (5, 12), (16, 12) is

(a) (7, 9) (b) (9, 7)
(c) (−9, 7) (d) (−7, 9)

152. The roots of the equation $\begin{vmatrix}1 & 4 & 20\\ 1 & -2 & 5\\ 1 & 2x & 5x^2\end{vmatrix}=0$ are

(a) −1, −2 (b) −1, 2
(c) 1, −2 (d) 1, 2

153. $x+ky-z=0$, $3x-ky-z=0$ and $x-3y+z=0$ has non-zero solution for k is equal to

(a) -1 (b) 0
(c) 1 (d) 2

154. If $\begin{bmatrix} x+y+z \\ x+y \\ y+z \end{bmatrix} = \begin{bmatrix} 9 \\ 5 \\ 7 \end{bmatrix}$, then the value of (x, y, z) is

(a) $(4, 3, 2)$
(b) $(3, 2, 4)$
(c) $(2, 3, 4)$
(d) None of the above

155. If A is $n \times n$ matrix, then adj (adj A) is equal to

(a) $|A|^{n-1} A$ (b) $|A|^{n-2} A$
(c) $|A|^n n$ (d) None of these

156. The value of determinant

$$\begin{vmatrix} a^2 & a & 1 \\ \cos(nx) & \cos(n+1)x & \cos(n+2)x \\ \sin(nx) & \sin(n+1)x & \sin(n+2)x \end{vmatrix}$$

is independent of

(a) n (b) a
(c) x (d) None of these

157. If $\begin{bmatrix} 3 & 1 \\ 4 & 1 \end{bmatrix} X = \begin{bmatrix} 5 & -1 \\ 2 & 3 \end{bmatrix}$, then X is equal to

(a) $\begin{bmatrix} -3 & 4 \\ 14 & -13 \end{bmatrix}$ (b) $\begin{bmatrix} 3 & -4 \\ -14 & 13 \end{bmatrix}$

(c) $\begin{bmatrix} 3 & 4 \\ 14 & 13 \end{bmatrix}$ (d) $\begin{bmatrix} -3 & 4 \\ -14 & 13 \end{bmatrix}$

158. If matrix $A = \begin{bmatrix} 1 & 0 & -1 \\ 3 & 4 & 5 \\ 0 & 6 & 7 \end{bmatrix}$ and its inverse is denoted by $A^{-1} = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$, then the value of a_{23} is equal to

(a) $\frac{21}{20}$ (b) $\frac{1}{5}$

(c) $-\frac{2}{5}$ (d) $\frac{2}{5}$

159. The rank of the matrix $\begin{vmatrix} 2 & 4 & 3 \\ 1 & 2 & -1 \\ -1 & -2 & 6 \end{vmatrix}$ is

(a) 1 (b) 2
(c) 3 (d) 4

160. $\cos\theta \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix} + \sin\theta \begin{bmatrix} \sin\theta & -\cos\theta \\ \cos\theta & \sin\theta \end{bmatrix}$ is equal to

(a) $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$

(c) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ (d) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

161. The solution of differential equation $(\sin x + \cos x)\, dy + (\cos x - \sin x)\, dx = 0$ is

(a) $e^x (\sin x + \cos x) + c = 0$
(b) $e^y (\sin x + \cos x) = c$
(c) $e^y (\cos x - \sin x) = c$
(d) $e^x (\sin x - \cos x) = c$

162. If $(G, *)$ is a group such that $a * b = b * a$ for two elements a and b, then

(a) $a^{-1} * b^{-1} = b^{-1} * a^{-1}$
(b) $a * b = a^{-1} * b^{-1}$
(c) $a^{-1} * b = a * b^{-1}$
(d) None of the above

163. The average of 5 quantities is 6, the average of three of them is 4, then the average of remaining two numbers is

(a) 9 (b) 6
(c) 10 (d) 5

164. A man can swim down stream at 8 km/h and up stream at 2 km/h, then the man's rate in still water and the speed of current is

(a) 5, 3 (b) 5, 4
(c) 3, 5 (d) 3, 3

165. Equation of curve through point (1, 0) which satisfies the differential equation $(1 + y^2)\, dx - xy\, dy = 0$ is

(a) $x^2 + y^2 = 4$ (b) $x^2 - y^2 = 1$
(c) $2x^2 + y^2 = 2$ (d) None of these

166. The order of the differential equation whose general solution is given by $y = (c_1 + c_2)\cos(x + c_3) - c_4 e^{x + c_5}$, where c_1, c_2, c_3, c_4 and c_5 are arbitrary constants, is

(a) 5 (b) 6
(c) 3 (d) 2

167. The equation of the base of an equilateral triangle is $x + y = 2$ and the vertex is $(2, -1)$, the length of the side of the triangle is

(a) $\frac{\sqrt{3}}{2}$ (b) $\sqrt{2}$

(c) $\sqrt{\frac{2}{3}}$ (d) $\sqrt{\frac{3}{2}}$

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

(a) $\frac{3}{2}$ (b) $\frac{3}{10}$

(c) 6 (d) 0

169. The area enclosed with in the curve $|x| + |y| = 1$ is

(a) $\sqrt{2}$ sq unit (b) 1 sq unit

(c) $\sqrt{3}$ sq unit (d) 2 sq unit

170. Coordinates of the foot of the perpendicular drawn from (0, 0) to the line joining $(a \cos \alpha, a \sin \alpha)$ and $(a \cos \beta, a \sin \beta)$ are

(a) $\left(\frac{a}{2}, \frac{b}{2}\right)$

(b) $\left[\frac{a}{2}(\cos \alpha + \cos \beta), \frac{a}{2}(\sin \alpha + \sin \beta)\right]$

(c) $\left[\cos \frac{\alpha + \beta}{2}, \sin \frac{\alpha + \beta}{2}\right]$

(d) $\left(0, \frac{b}{2}\right)$

171. The lines $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ are perpendicular to each other, if

(a) $a_1b_2 - b_1a_2 = 0$ (b) $a_1a_2 + b_1b_2 = 0$

(c) $a_1^2b_2 + b_1^2a_2 = 0$ (d) $a_1b_1 + a_2b_2 = 0$

172. The angle between the pair of straight lines $y^2 \sin^2 \theta - xy \sin^2 \theta + x^2 (\cos^2 \theta - 1) = 1$, is

(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{2}$

(c) $\frac{2\pi}{3}$ (d) None of these

173. If two circles $(x-1)^2 + (y-3)^2 = r^2$ and $x^2 + y^2 - 8x + 2y + 8 = 0$ intersect in two distinct points, then

(a) $2 < r < 8$ (b) $r = 2$

(c) $r < 2$ (d) $r > 2$

174. The equation of circle passing through the points (0, 0), (0, b) and (a, b) is

(a) $x^2 + y^2 + ax + by = 0$

(b) $x^2 + y^2 - ax + by = 0$

(c) $x^2 + y^2 - ax - by = 0$

(d) $x^2 + y^2 + ax - by = 0$

175. Two circles

$$S_1 = x^2 + y^2 + 2g_1x + 2f_1y + c_1 = 0$$

and $S_2 = x^2 + y^2 + 2g_2x + 2f_2y + c_2 = 0$

cut each other orthogonally, then

(a) $2g_1g_2 + 2f_1f_2 = c_1 + c_2$

(b) $2g_1g_2 - 2f_1f_2 = c_1 + c_2$

(c) $2g_1g_2 + 2f_1f_2 = c_1 - c_2$

(d) $2g_1g_2 - 2f_1f_2 = c_1 - c_2$

176. The equation

$13[(x-1)^2 + (y-2)^2] = 3(2x + 3y - 2)^2$

represents

(a) parabola (b) ellipse

(c) hyperbola (d) None of these

177. Vertex of the parabola $9x^2 - 6x + 36y + 9 = 0$ is

(a) $\left(\frac{1}{3}, -\frac{2}{9}\right)$ (b) $\left(-\frac{1}{3}, -\frac{1}{2}\right)$

(c) $\left(-\frac{1}{3}, \frac{1}{2}\right)$ (d) $\left(\frac{1}{3}, \frac{1}{2}\right)$

178. If the foci and vertices of an ellipse be $(\pm 1, 0)$ and $(\pm 2, 0)$, then the minor axis of the ellipse is

(a) $2\sqrt{5}$ (b) 2

(c) 4 (d) $2\sqrt{3}$

179. The one of the curve which does not represent a hyperbola, is

(a) $xy = 1$

(b) $x^2 - y^2 = 5$

(c) $(x-1)(y-3) = 0$

(d) $x^2 - y^2 = 0$

180. Eccentricity of the conic $16x^2 + 7y^2 = 112$ is

(a) $\frac{3}{\sqrt{7}}$ (b) $\frac{7}{16}$

(c) $\frac{3}{4}$ (d) $\frac{4}{3}$

181. If f and g are continuous function on $[0, a]$ satisfying $f(x) = f(a-x)$ and $g(x) + g(a-x) = 2$, then $\int_0^a f(x) g(x)$ is equal to

(a) $\int_0^a f(x)\,dx$ (b) $\int_a^0 f(x)\,dx$

(c) $2\int_0^a f(x)\,dx$ (d) None of these

182. The value of α which satisfying $\int_{\pi/2}^{\alpha} \sin x \, dx = \sin 2\alpha$; $\alpha \in (0, 2\pi)$ are equal to

(a) $\frac{\pi}{2}$ (b) $\frac{3\pi}{2}$

(c) $\frac{7\pi}{6}$ (d) All of these

183. The value of $\int_0^{n\pi+\theta} |\sin x| \, dx$ is

(a) $2n + 1 + \cos\theta$ (b) $2n + 1 - \cos\theta$

(c) $2n + 1$ (d) $2n + \cos\theta$

184. The value of $\int_{\pi}^{2\pi} [2\sin x] \, dx$ where [·] represents greatest integer function, is

(a) $-\pi$ (b) -2π

(c) $-\frac{5\pi}{3}$ (d) $\frac{5\pi}{3}$

185. By Simpson's rule, the value of $\int_1^7 \frac{dx}{x}$ is

(a) 1.358 (b) 1.957

(c) 1.625 (d) 1.458

186. The value of x_0 (the initial value of x) to get the solution in interval (0.5, 0.75) of the equation $x^3 - 5x + 3 = 0$ by Newton-Raphson method is

(a) 0.5 (b) 0.75

(c) 0.625 (d) 0.60

187. By Bisection method, the real root of the equation $x^3 - 9x + 1 = 0$ lying between $x = 2$ and $x = 4$ is nearer to

(a) 2.2 (b) 2.75

(c) 5.5 (d) 4.0

188. By False-poisitioning, the second approximation of a root of equation $f(x) = 0$ is (where x_0, x_1 are initial and first approximations respectively)

(a) $x_0 = \frac{f(x_0)}{f(x_1) - f(x_0)}$

(b) $\frac{x_0 f(x_1) - x_1 f(x_0)}{f(x_1) - f(x_0)}$

(c) $\frac{x_0 f(x_0) - x_1 f(x_1)}{f(x_1) - f(x_0)}$

(d) $x_1 - \frac{f(x_0)}{f(x_1) - f(x_0)}$

189. Let $f(0) = 1$, $f(1) = 2.72$, then the Trapezodial rule gives approximation value of $\int_0^1 f(x) \, dx$ is

(a) 3.72 (b) 1.86

(c) 1.72 (d) 0.86

190. If α and β are the imaginary cube roots of unity, then $\alpha^4 + \beta^4 + \frac{1}{\alpha\beta}$ is equal to

(a) 3 (b) 0

(c) 1 (d) 2

191. The complex number $z = x + iy$, which satisfy the equation $\left|\frac{z - 5i}{z + 5i}\right| = 1$ lies on

(a) real axis

(b) the line $y = 5$

(c) a circle passing through the origin

(d) None of the above

192. If $\left(\frac{1+i}{1-i}\right)^m = 1$, then the least integral value of m is

(a) 2 (b) 4

(c) 8 (d) None of these

193. If 1, ω, ω^2 are the cube roots of unity, then $\frac{a + b\omega + c\omega^2}{c + a\omega + b\omega^2} + \frac{a + b\omega + c\omega^2}{b + c\omega + a\omega^2}$ is equal to

(a) 1 (b) 0

(c) 2 (d) -1

194. If ω is an imaginary cube root of unity, then $(1 + \omega - \omega^2)^7$ equals

(a) $128\,\omega$ (b) $-128\,\omega$

(c) $128\,\omega^2$ (d) $-128\,\omega^2$

195. The value of the sum $\sum_{n=1}^{13} (i^n + i^{n+1})$ where $i = \sqrt{-1}$, equals

(a) i (b) $i - 1$

(c) $-i$ (d) 0

196. The number of ways in which 6 rings can be worn on four fingers of one hand, is

(a) 4^6 (b) ${}^6C_4$

(c) 6^4 (d) 24

197. Number greater than 1000 but not greater than 4000 which can be formed with the digits 0, 1, 2, 3, 4, are (repetition of digits is allowed)

(a) 350 (b) 375

(c) 450 (d) 576

198. How many words can be formed from the letters of the word DOGMATIC, if all the vowels remain together

(a) 4140 (b) 4320

(c) 432 (d) 43

199. [illegible]
θ

(a) $1 \le A \le 2$ (b) $\frac{3}{4} \le A \le 1$

(c) $\frac{13}{16} \le A \le 1$ (d) $\frac{3}{4} \le A \le \frac{13}{16}$

200. [illegible]
$a + c\sqrt{2}$ is equal to

(a) 0 (b) 1

(c) b (d) $2b$