76. The geometric mean of three numbers was computed as 6. It was subsequently found that, in this computation, a number 8 was wrongly read as 12. What is the correct geometric mean ?

(a) 4

(b) $\sqrt[3]{5}$ Ans: B

(c) $2\sqrt[3]{18}$

(d) None of the above

77. Let $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} = [a_{ij}]$, where i, j = 1, 2. If its inverse matrix is $[b_{ij}]$, what is b_{22} ?

(a) -2

(b) 1

(c) $\frac{3}{2}$ Ans: D

(d) $-\frac{1}{2}$

78. The angle A lies in the third quadrant and it satisfies the equation $4(\sin^2 x + \cos x) = 1$. What is the measure of the angle A ?

(a) 225°

(b) 240° Ans: B

(c) 210°

(d) None of the above

79. What is the area enclosed between the curves $y^2 = 12x$ and the lines $x = 0$ and $y = 6$?

(a) 2 square units

(b) 4 square units Ans: C

(c) 6 square units

(d) 8 square units

80. In a triangle ABC, BC = $\sqrt{39}$, AC = 5 a AB = 7. What is the measure of the ang A ?

(a) $\frac{\pi}{4}$

(b) $\frac{\pi}{3}$ Ans: B

(c) $\frac{\pi}{2}$

(d) $\frac{\pi}{6}$

81. What is the modulus of $\frac{1+2i}{1-(1-i)^2}$?

(a) 1

(b) $\sqrt{5}$ Ans: A

(c) $\sqrt{3}$

(d) 5

82. If the line through the points A (k, 1, –1) a B (2k, 0, 2) is perpendicular to the l through the points B and C (2 + 2k, k, 1), th what is the value of k ?

(a) –1

(b) 1

(c) –3 Ans: D

(d) 3

83. What is $\int \frac{1}{1+e^x}\,dx$ equal to ?

(a) $x - ln\ x + c$ Ans: C

(b) $x - ln\ (\tan x) + c$

(c) $x - ln\ (1 + e^x) + c$

(d) $ln\ (1 + e^x) + c$

where c is a constant of integration.

84. The function $f(x) = x \operatorname{cosec} x$ is

(a) continuous for all values of x

(b) discontinuous everywhere

(c) continuous for all x except at $x = n\pi$, where n is an integer

(d) continuous for all x except at $x = n\pi/2$, where n is an integer

Ans: C

85. What is the solution of the differential equation $a\left(x\frac{dy}{dx} + 2y\right) = xy\frac{dy}{dx}$?

(a) $x^2 = kye^{\frac{y}{a}}$

(b) $yx^2 = kye^{\frac{y}{a}}$ Ans: B

(c) $y^2x^2 = kye^{\frac{y^2}{a}}$

(d) None of the above

where k is a constant.

86. A vector $\vec{b}$ is collinear with the vector $\vec{a} = (2, 1, -1)$ and satisfies the condition $\vec{a} \cdot \vec{b} = 3$. What is $\vec{b}$ equal to ?

(a) (1, 1/2, –1/2)

(b) (2/3, 1/3, –1/3) Ans: A

(c) (1/2, 1/4, –1/4)

(d) (1, 1, 0)

87. What is the least positive integer n for which $\left(\frac{1+i}{1-i}\right)^n = 1$?

Ans: D

(a) 16

(b) 12

(c) 8

(d) 4

88. The vectors $\vec{a} = x\hat{i} + y\hat{j} + z\hat{k}$, $\vec{b} =$ [illegible] $\vec{c}$ are such that they form a right-hand system. What is $\vec{c}$ equal to ?

(a) $\hat{j}$

(b) $y\hat{j} - x\hat{k}$ Ans: C

(c) $y\hat{i} - x\hat{j}$

(d) $x\hat{i} - y\hat{j}$

89. If $x = t^2$, $y = t^3$, then what is $\frac{d^2y}{dx^2}$ equ to ?

(a) 1

(b) $\frac{3}{2t}$ Ans: C

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

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

90. What is $\int_{\frac{-\pi}{4}}^{\frac{\pi}{4}} \tan^3 x \, dx$ equal to ?

(a) $\sqrt{3}$ Ans: D

(b) $\frac{1}{3}$

(c) $\frac{1}{2}$

(d) 0

91. Let O (0, 0, 0), P (3, 4, 5), Q (m, n, r) and R (1, 1, 1) be the vertices of a parallelogram taken in order. What is the value of m + n + r ?

(a) 6

(b) 12

(c) 15

(d) More than 15

Ans: C

92. What is the solution of the differential equation $3\,e^x \tan y\,dx + (1 + e^x)\sec^2 y\,dy = 0$?

(a) $(1 + e^x) \tan y = c$

(b) $(1 + e^x)^3 \tan y = c$

(c) $(1 + e^x)^2 \tan y = c$

(d) $(1 + e^x) \sec^2 y = c$

where c is a constant of integration.

Ans: B

93. What is the locus of points, the difference of whose distances from two points being constant ?

(a) Pair of straight lines

(b) An ellipse

(c) A hyperbola

(d) A parabola

Ans: C

94. What is the differential equation for $y^2 = 4a(x - a)$?

(a) $yy' - 2xyy' + y^2 = 0$

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

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

(d) $yy' - 2xyy' + y = 0$

Ans: A

95. If the angle between the vectors $\vec{a}$ and is $\frac{\pi}{3}$, what is the angle between $-5\vec{a}$ $6\vec{b}$?

(a) $\frac{\pi}{6}$

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

(c) $\frac{2\pi}{5}$

(d) $\frac{3\pi}{7}$

Ans: B

96. What is the degree of the differential equa

$$\frac{d^2y}{dx^2} - \sqrt{1 + \left(\frac{dy}{dx}\right)^3} = 0 \ ?$$

(a) 1

(b) 2

(c) 3

(d) 6

Ans: B

97. If $\int x^2 \ln x\,dx = \frac{x^3}{m}\ln x + \frac{x^3}{n} + c$,

what are the values of m and n respective

(a) 1/3, −1/9

(b) 3, − 9

(c) 3, 9

(d) 3, 3

where c is a constant of integration.

Ans: B