98. What is the principal value of $\csc^{-1}(-\sqrt{2})$?

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

(b) $\dfrac{\pi}{2}$

(c) $-\dfrac{\pi}{4}$

(d) 0

Ans: C

99. If $f: R \to R$, $g: R \to R$ and $g(x) = x + 3$ and $(f \circ g)(x) = (x + 3)^2$, then what is the value of $f(-3)$?

(a) -9

(b) 0

(c) 9

(d) 3

$(x + 6)^2$

Ans: C

100. What is the value of $\displaystyle\lim_{x \to 1} \dfrac{(x-1)^2}{|x-1|}$?

(a) 0

(b) 1

(c) -1

(d) The limit does not exist

Ans: B

101. A balloon is pumped at the rate of 4 cm^3 per second. What is the rate at which its surface area increases when its radius is 4 cm ?

(a) 1 cm^2/sec

(b) 2 cm^2/sec

(c) 3 cm^2/sec

(d) 4 cm^2/sec

Ans: B

102. What is the value of $\dfrac{1 + \tan 15°}{1 - \tan 15°}$?

(a) 1

(b) $\dfrac{1}{\sqrt{2}}$

(c) $\dfrac{1}{\sqrt{3}}$

(d) $\sqrt{3}$

Ans: D

103. If $f(x) = kx^3 - 9x^2 + 9x + 3$ is monotonically increasing in every interval, then which one of the following is correct ?

(a) $k < 3$

(b) $k \le 3$

(c) $k > 3$

(d) $k \ge 3$

Ans: D

104. If $\sin^{-1}\dfrac{5}{x} + \sin^{-1}\dfrac{12}{x} = \dfrac{\pi}{2}$, then what is the value of x ?

(a) 1

(b) 7

(c) 13

(d) 17

$\sin^{-1}\dfrac{5}{x} = a$

$\sin a = \dfrac{5}{x}$

$x = \dfrac{5}{\sin a}$

Ans: C

105. If α, β are the roots of the quadratic equation $x^2 - x + 1 = 0$, then which of the following is correct ?

(a) $(\alpha^4 - \beta^4)$ is real

(b) $2(\alpha^5 + \beta^5) = (\alpha\beta)^5$

(c) $(\alpha^6 - \beta^6) = 0$

(d) $(\alpha^8 + \beta^8) = (\alpha\beta)^8$

Ans: A

106. What is the value of $\sqrt{3} \csc 20° - \sec 20°$?

(a) 1/4

(b) 4

Ans: B

(c) 2

(d) 1

107. The probability distribution of random variable X with two missing probabilities p_1 and p_2 is given below :

X	P(X)	
1	k	0.25
2	p_1	0.25
3	4k	
4	p_2	0.35
5	2k	0.35

It is further given that $P(X \leq 2) = 0.25$ and $P(X \geq 4) = 0.35$.

Consider the following statements :

1. $p_1 = p_2$

2. $p_1 + p_2 = P(X = 3)$

$0.25 + 0.3$

0.60

Which of the statements given above is/are correct ?

(a) 1 only

Ans: A

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

108. If angles A, B, C are in AP, then what is $\sin A + 2 \sin B + \sin C$ equal to ?

(a) $4 \sin B \cos^2 \left(\dfrac{A-C}{2} \right)$

(b) $4 \sin B \cos^2 \left(\dfrac{A-C}{4} \right)$ Ans: B

(c) $4 \sin (2B) \cos^2 \left(\dfrac{A-C}{2} \right)$

(d) $4 \sin (2B) \cos^2 \left(\dfrac{A-C}{4} \right)$

109. *Statement I :*   If $-1 \leq x < 0$, then
$$\cos (\sin^{-1} x) = -\sqrt{1-x^2}.$$

Statement II :   If $-1 \leq x < 0$, then
$$\sin (\cos^{-1} x) = \sqrt{1-x^2}.$$

Which one of the following is correct in resp of the above statements ?

(a) Both statements I and II independently correct and statement is the correct explanation statement I

(b) Both statements I and II independently correct but statement is not the correct explanation statement I

(c) Statement I is correct but statement is false

(d) Statement I is false but statement correct

Ans: B