

101. The area of the figure bounded by  $y^2 = 2x + 1$  and  $x - y = 1$  is  
 (a)  $\frac{2}{3}$       (b)  $\frac{4}{3}$   
 (c)  $\frac{8}{3}$       (d)  $\frac{11}{3}$
102. The order of the differential equation of all tangent lines to the parabola  $y = x^2$  is  
 (a) 1      (b) 2  
 (c) 3      (d) 4
103.  $\int \frac{dx}{\sqrt{(1-x)(x-2)}}$  is equal to  
 (a)  $\sin^{-1}(2x-3)+C$       (b)  $\sin^{-1}(2x+5)+C$   
 (c)  $\sin^{-1}(3-2x)+C$       (d)  $\sin^{-1}(5-2x)+C$
104.  $\int \frac{(\sec^2 x - 7)}{\sin^7 x} dx$  is equal to  
 (a)  $\frac{\tan x}{\sin^7 x} + C$       (b)  $\frac{\cos x}{\sin^7 x} + C$   
 (c)  $\frac{\sin x}{\cos^7 x} + C$       (d)  $\frac{\sin x}{\tan^7 x} + C$
105.  $\int_{-3}^2 \{ |x+1| + |x+2| + |x-1| \} dx$  is equal to  
 (a)  $\frac{31}{2}$       (b)  $\frac{35}{2}$   
 (c)  $\frac{37}{2}$       (d)  $\frac{39}{2}$
106. The variance of first  $n$  natural numbers is  
 (a)  $\frac{n^2+1}{12}$       (b)  $\frac{n^2-1}{12}$   
 (c)  $\frac{(n+1)(2n+1)}{6}$       (d)  $\left[ \frac{n(n+1)}{2} \right]^2$
107. A particular solution of  $\log \left( \frac{dy}{dx} \right) = 3x + 4y$ ,  $y(0) = 0$  is  
 (a)  $e^{3x} + 3e^{-4y} = 4$       (b)  $4e^{3x} - 3e^{-4y} = 3$   
 (c)  $3e^{3x} + 4e^{-4y} = 7$       (d)  $4e^{3x} + 3e^{-4y} = 7$
108. The equation of the curve whose subnormal is equal to a constant 'a' is  
 (a)  $y = ax + b$       (b)  $y^2 = 2ax + 2b$   
 (c)  $ay^2 - x^3 = a$       (d) None of these



(a)  $\sqrt{14}$   
(c)  $\sqrt{29}$

(b)  $\sqrt{18}$   
(d) 4

145. The period of the function  $f(x) = \operatorname{cosec}^2 3x + \cot 4x$  is

(a)  $\frac{\pi}{3}$   
(b)  $\frac{\pi}{4}$   
(c)  $\frac{\pi}{6}$   
(d)  $\pi$

146. The graph of the function  $f(x) = \log_a(x + \sqrt{x^2 + 1})$  is symmetric about

(a) x-axis  
(b) origin  
(c) y-axis  
(d) the line  $y = x$

147. The difference between the greatest and least values of the function

$f(x) = \cos x + \frac{1}{2} \cos 2x - \frac{1}{3} \cos 3x$  is

(a)  $\frac{2}{3}$   
(b)  $\frac{8}{7}$   
(c)  $\frac{3}{8}$   
(d)  $\frac{9}{4}$

148. If  $f(x) = \begin{cases} ax^2 + b, & b \neq 0, x \leq 1 \\ bx^2 + ax + c, & x > 1 \end{cases}$

then  $f(x)$  is continuous and differentiable at  $x = 1$  if

(a)  $c = 0, a = 2b$   
(b)  $a = b, c \in R$   
(c)  $a = b, c = 0$   
(d)  $a = b, c \neq 0$

149. Let  $g(x)$  be the inverse of function  $f(x)$  and

$f'(x) = \frac{1}{1+x^3}$ , then  $g'(x)$  is equal to

(a)  $\frac{1}{1+\{g(x)\}^3}$   
(b)  $\frac{1}{1+\{f(x)\}^3}$   
(c)  $1+\{g(x)\}^3$   
(d)  $1+\{f(x)\}^3$

150. If  $\theta$  is the semi vertical angle of a cone of maximum volume and given slant height, then  $\tan \theta$  is given by

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

## Answer – Key

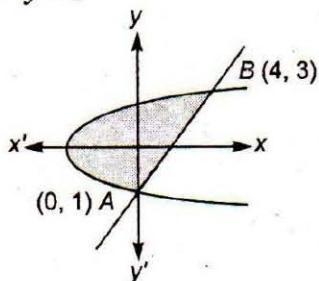
101. *	102. a	103. a	104. a	105. *	106. b	107. c	108. b	109. b	110. a
111. c	112. c	113. b	114. c	115. *	116. d	117. a	118. c	119. b	120. a
121. b	122. a	123. d	124. b	125. c	126. c	127. d	128. c	129. d	130. b
131. a	132. b	133. c	134. c	135. c	136. a	137. d	138. d	139. c	140. c
141. c	142. c	143. a	144. b	145. d	146. b	147. d	148. a	149. c	150. c

## Hints and Solutions

101. Given curves are

$$y^2 = 2x + 1$$

and  $x - y = 1$



Points of intersection are  $A(0, -1)$  and  $B(4, 3)$ .

$$\text{Area} = \int_{-1}^3 (1+y) dy - \int_{-1}^3 \left(\frac{y^2-1}{2}\right) dy$$

$$\begin{aligned}
 &= \left[ y + \frac{y^2}{2} \right]_{-1}^3 - \left[ \frac{1}{2} \left( \frac{y^3}{3} - y \right) \right]_{-1}^3 \\
 &= \left[ 3 + \frac{9}{2} - \left( -1 + \frac{1}{2} \right) \right] - \frac{1}{2} \left[ 9 - 3 - \left( -\frac{1}{3} + 1 \right) \right] \\
 &= 8 - \frac{8}{3} = \frac{16}{3}
 \end{aligned}$$

102. Given curve is  $y = x^2$

For this curve there is only one tangent line i.e., x-axis ( $y = 0$ )

$$\therefore \frac{dy}{dx} = 0$$

Hence, order is 1.

103. Let  $I = \int \frac{dx}{\sqrt{(1-x)(x-2)}}$