

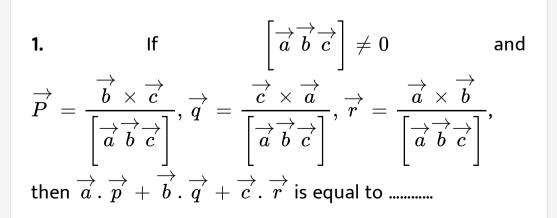


## MATHS

# BOOKS - GURUKUL BOOKS & PACKAGING MATHS (HINGLISH)

OCTOBER 2014





A. 0

B. 1

C. 2

D. 3

Answer: D

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2. Select and write the most appropriate answer from the

given alternatives in each of the following :

The inverse of the matrix

$$egin{pmatrix} 2 & 0 & 0 \ 0 & 1 & 0 \ 0 & 0 & -1 \end{pmatrix}$$
 is

A. 
$$\begin{bmatrix} \frac{1}{2} & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$$
  
B. 
$$\begin{bmatrix} -\frac{1}{2} & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$
  
C. 
$$\begin{bmatrix} -1 & 0 & 0 \\ 0 & -\frac{1}{2} & 0 \\ 0 & 0 & \frac{1}{2} \end{bmatrix}$$
  
D. 
$$-\frac{1}{2} \begin{bmatrix} -\frac{1}{2} & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$$

#### Answer: A



**3.** Direction cosines of the line passing through the points

 $A(-4,2,3) \,\, {
m and} \,\, B(1,3,\,-2)$  are

A. 
$$\pm \frac{1}{\sqrt{51}}, \pm \frac{5}{\sqrt{51}}, \pm \frac{1}{\sqrt{51}}$$
  
B.  $\pm \frac{5}{\sqrt{51}}, \pm \frac{1}{\sqrt{51}}, \pm \frac{-5}{\sqrt{51}}$   
C.  $\pm 5, \pm 1, \pm 5$ 

D. 
$$\pm\sqrt{51}m\sqrt{51}, \ \pm\sqrt{51}$$

### Answer: B



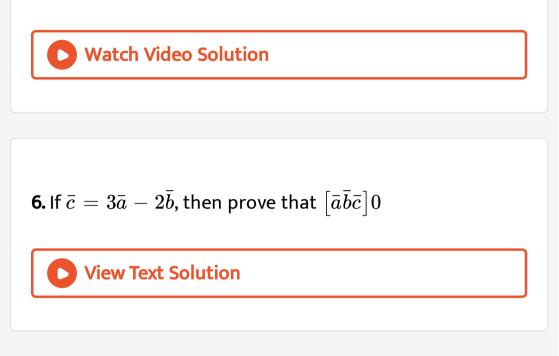
**4.** Write the truth values of the following statements :

(a)  $\sqrt{5}$  is an irrational number but  $3+\sqrt{5}$  is a complex

### number

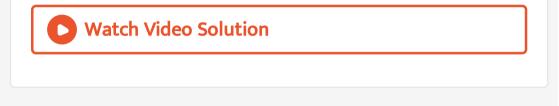
5. Write the truth values of the following statements :

(b)  $\exists n \in N$  such that n+5 > 10



7. Find the vector equation of the plane which is at a distance of 5 units from the origin and which is normal to the vector  $2\hat{i} + \hat{j} + 2\hat{k}$ .

8. The Cartesian equation of a line are 3x + 1 = 6y = 2 = 1 - z. Find the direction ratios and write down its equation in vector form.



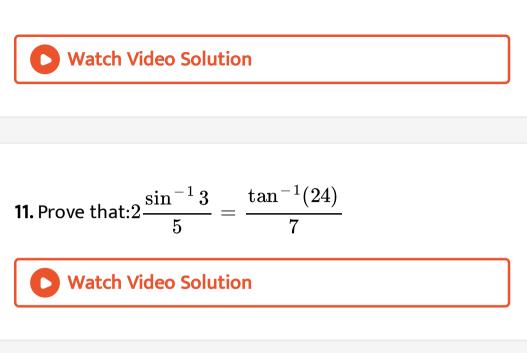
**9.** Using truth table, prove the following logical equivalence

 $(p \wedge q) o r \equiv p o (q o r)$ 



10. Find the joint equation of the pair of the lines through the origin each of which is making an angle of  $30^{\circ}$  with

the line 3x + 2y - 11 = 0.



**12.** Solve the following equations by the method of reduction

2x - y + z = 1, x + 2y + 3x = 8, 3x + y - 4z = 1.

**13.** Prove that volume of a parallelopiped with coterminal edges as  $\bar{a}$ ,  $\bar{b}$ ,  $\bar{c}$  is  $[\bar{a}, \bar{b}, \bar{c}]$ . Hence find the volume of the parallelopiped with coterminal edges  $\hat{i} + \hat{j}$ ,  $\hat{j} + \hat{k}$  and  $\hat{k} + \hat{i}$ .

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14. Solve the following LPP by using graphical method.

Maximize : Z = 6x + 4y,

### Subject

to

 $x\leq 2,$   $x+y\leq 2,$   $-2x+y\leq 1,$   $x\geq 0,$   $y\geq 0.$  Also

find maximum value of Z.

15. In riangle ABC , with the usual notations , prove that  $2\left\{a\sin^2,\frac{C}{2}+c\sin^2,\frac{A}{2}\right\}=a+c-b$ 

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16. Assuming p and q as given, write the verbal statement

for the following symoblic statements :

p : It is a day time. " " q : It is warm.

(i)  $p \wedge \mathsf{-}q$  (ii)  $\mathsf{-}p o q$  (iii) q o p



17. If the lines 
$$\frac{x-1}{2} = \frac{y+1}{3} = \frac{z-1}{4}$$
 and  $\frac{x-3}{1} = \frac{y-k}{2} = \frac{z}{1}$ 

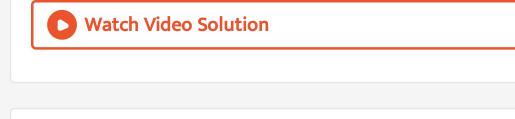
intersect, then find the value of k.

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**18.** Parametric form of the equation of the plane is 
$$\bar{r} = (2\hat{i} + \hat{k}) + \lambda\hat{i} + \mu(\hat{i} + 2\hat{i} - 3\hat{k})\lambda$$
 and  $\mu$  are parameters. Find normal to the plane and hence equation of the plane in normal form. Write its Cartesion form.

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19. If the angle between the lines represented by  $ax^2 + 2hxy + by^2 = 0$  is equal to the angle between the lines  $2x^2 - 5xy + 3y^2 = 0$ , then show that  $100(h^2 - ab) = (a + b)^2$ .

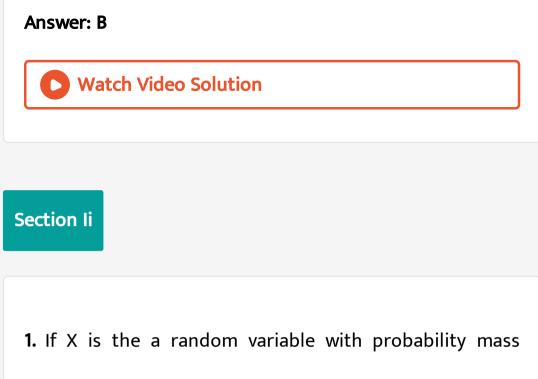


 $\mathbf{20.} \sin x \tan x - 1 = \tan x - \sin x$ 

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21. The differential equation of the family of curves  $y = c_1 e^x + c_2 e^{-x}$  is  $d^2 u$ 

A. 
$$rac{d^2y}{dx^2}+y=0$$
  
B.  $rac{d^2y}{dx^2}-y=0$   
C.  $rac{d^2y}{dx^2}+1=0$   
D.  $rac{d^2y}{dx^2}-1=0$ 



function P(x) = kx, for x = 1,2,3

= 0, otherwise

then k = .....

A. 
$$\frac{1}{5}$$
  
B.  $\frac{1}{4}$   
C.  $\frac{1}{6}$ 

### Answer: C

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2. If 
$$\operatorname{sec}\left(\frac{x+y}{x-y}\right) = a^2$$
, then  $\frac{d^2y}{dx^2} = \dots$ 

B. x

C. 
$$\frac{y}{x}$$

D. 0

#### Answer: C

**3.** If 
$$y = \sin^{-1}(3x) + \sec^{-1}\left(rac{1}{3x}
ight)$$
, find  $rac{dy}{dx}$ .

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**4.** Evaluate : 
$$\int x \log x dx$$

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5. if 
$$\int_0^k \frac{dx}{2+8x^2} = \frac{\pi}{16}$$
 then find the value of  $k$ 

**6.** The probability that a certain kind of component will survive a check test is 0.5. Find the probability that exactly two of the next four components tested will survive.

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7. Find the area of the region bounded by the curve

$$y=\sin x$$
 , the lines  $x=-rac{\pi}{2}, x=rac{\pi}{2}$  and X- axis.

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**8.** Examine the continuity of the following function at given point :

$$f(x)=rac{\log x-\log 8}{x-8}, ext{for} \ \ x
eq 8$$

8 , for 
$$x = 8$$

at , x=8

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9. If  $x=\phi(t)$  is a differentiable function of 't', then prove that  $\int\!\!f(x)dx=\int\!\!f[\phi(t)]\phi'(t)dt.$ 

**View Text Solution** 

10.

$$3e^x an y dx + (1+e^x) \mathrm{sec}^2 \, dy = 0, \hspace{0.2cm} ext{when} x = 0 \hspace{0.2cm} ext{an} \hspace{0.2cm} y = \pi$$

**11.** A point source of light is hung 30 feet directly above a straight horizontal path on which a man of 6 feet in height is walking. How fast is the man's shadow lengthening and how fast the tip of shadow is moving when he is walking away from the light at the rate of 100 ft/min.

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### 12. Evaluate the following integrals:

$$\int\!\!\frac{\log x}{\left(1+\log x\right)^2}dx$$

13. If x = f(t), y = g(t) are differentiable functions of parameter 't' then prove that y is a differentiable function of 'x' and

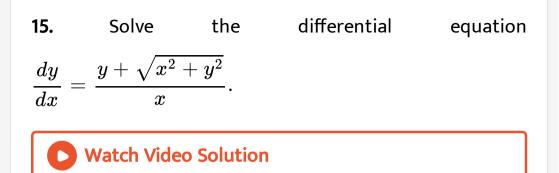
$$rac{dy}{dx}=rac{rac{dy}{dt}}{rac{dx}{dt}}, rac{dx}{dt}
eq 0$$
  
Hence find  $rac{dy}{dx}$  if  $x=a\cos t, y=a\sin t$ 

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14. Show that the function defined by  $f(x) = |\cos x|$  is a

continuous function.





**16.** Given X ~ B(n,p) If n= 20,, E(x)= 10 , Find p, Car(X) and

S.D (X)

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17. A bakerman sells 5 types of cakes. Profit due to the sale of each type of cake is respectively Rs3, Rs 2.5, Rs 2, Rs 1.5, Rs 1. The demands for these cakes are

10~% , 5~% , 25~% , 45~%~ and 15~%~ respectively.. What is

he expected profit per cake?

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**18.** Varify Lagrange's mean value theorem for the function  $f(x) = x + rac{1}{x}, x \in [1,3]$ 

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19. 
$$\int_a^b f(x)dx = \int_a^b f(a+b-x)dx.$$
 Hence evaluate :  $\int_a^b rac{f(x)}{f(x)+f(a+b-x)}dx.$