



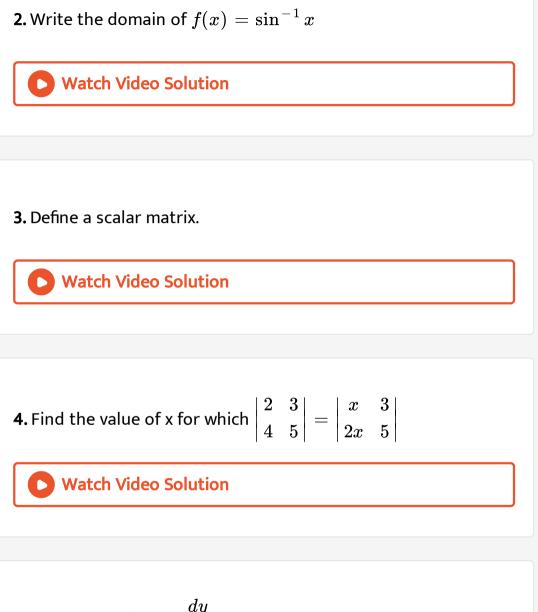
## MATHS

# BOOKS - JEEVITH PUBLICATIONS MATHS (KANNADA ENGLISH)

# SUPPLEMENTARY EXAM QUESTION PAPER (WITH ANSWERS) JUNE 2016

### Part A

1. An operation \* on  $z^+$  ( the set of all non-negative integers) is defined as  $a\cdot b=|\ a-b|,\ \forall q,b\in z^+.$ Is \* a binary operation on  $z^+$ ?



5. If 
$$\tan(2x+3)$$
, find  $\frac{dy}{dx}$ .

6. Find : 
$$\int (2x^2 + e^x) dx$$
.

7. Find unit vector in which the direction of vector $ec{a}=2\hat{i}+3\hat{j}+\hat{k}.$ 

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8. Write the direction cosines of z-axis.



9. Define optimal solution in linear programming problem.

10.

$$P(A) = rac{7}{13}, P(B) = rac{9}{13} ext{ and } P(A \cap B) = rac{4}{13}, ext{ find } P(A/B)$$

lf

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#### Part B

1. Find gof and fog if 
$$f\colon R o R$$
 and  $g\colon R o R$  are given by  $f(x)=\cos x$  and  $g(x)=3x^2$ 

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2. Prove the following:

$$\sin^{-1}ig(3x-4x^3ig)=3\sin^{-1}x,xarepsilonigg[-rac{1}{2},rac{1}{2}igg]$$

**3.** Evaluate 
$$\sin^{-1}\left(\sin\left(\frac{2\pi}{3}\right)\right)$$

4. Find the area of the triangle with vertices, (3,8), (-4,2) and (5,1)

using determinants.

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5. 
$$y = \cos^{-1} \left( rac{1-x^2}{1+x^2} 
ight), 0 < x < 1.$$

**6.** Find 
$$rac{dy}{dx}, \quad ext{if} \quad y=x^{\sin x}, \, x>0.$$



7. Find the interval in which the function f given by  $f(x) = 2x^2 - 3x$  is strictly increasing.

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$$\mathbf{8.} \int x^2 \log x dx.$$

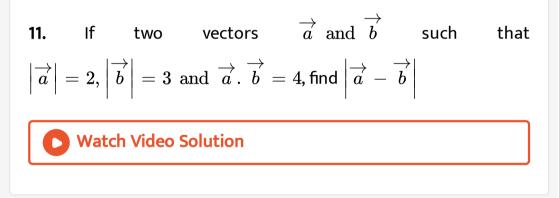
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9. Evaluate: 
$$\int_0^1 rac{dx}{\sqrt{1-x^2}}$$

10. Find the order and degree of the differential equation

$$d^3rac{y}{dx^3}+2d^2rac{y}{dx^2}+rac{dy}{dx}=0$$

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12. Find the area of the parallelogram whose adjacent sides are

determined by the vectors  $\overrightarrow{a} = \hat{i} - \hat{j} + 3\hat{k} ext{ and } \overrightarrow{b} = 2\hat{i} - 7\hat{j} + \hat{k}$ 

**13.** Show that the lines  $\frac{x-5}{7} = \frac{y+2}{-5} = \frac{z}{1}$  and  $\frac{x}{1} = \frac{y}{2} = \frac{x}{3}$  are perpendicular

to each other.

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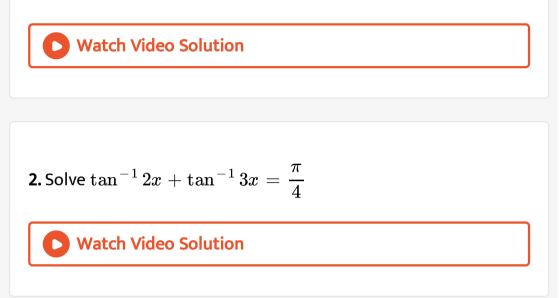
14. Find the probability distribution of

number of heads in two tosses of a coin .



1. Show that the relation R in the set A={1,2,3,4,5} given by R=

{(a,b) : |a-b| is even}, is an equivalence relation.



3. By using elementary transformations, find the inverse of the

 $\mathsf{matrix}\,A = \left[ \begin{array}{cc} 1 & 3 \\ 2 & 7 \end{array} \right]$ 

4. If  $x = a(\theta - \sin \theta)$  and  $y = a(1 + \cos \theta)$ , then prove that  $\frac{dy}{dx} = -\cot\left(\frac{\theta}{2}\right)$ .



5. Verify Mean Value Theorem for the function  $f(x)=x^2$  in the

interval [2,4].



6. Using differentials, find the approximate value of  $(25)^{\frac{1}{3}}$ .



7. Evaluate : 
$$\int e^{x} \left( \frac{1 + \sin x}{1 + \cos x} \right) dx$$



**8.** Evaluate: 
$$\int rac{x}{(x+1)(x+2)} dx$$

**9.** Find the area of the region bounded by the curve  $y^2 = 9x, x = 2, x = 4$  and the x-axis in the first quadrant.

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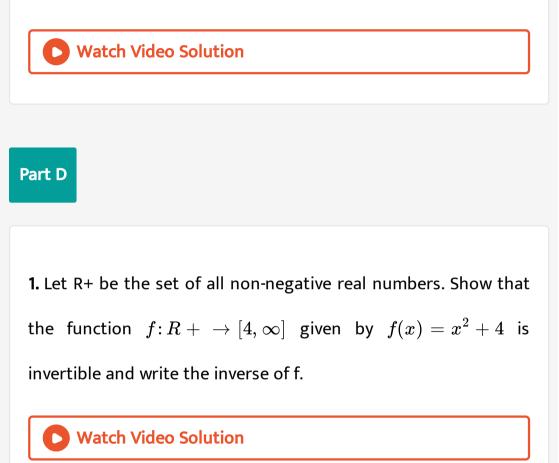
**10.** Form the differential equation representing family of curve  $\frac{x}{a} + \frac{y}{b}$  =1 where a and b are arbitrary constants .

11. Prove that 
$$\left[\overrightarrow{a} + \overrightarrow{b}, \overrightarrow{b} + \overrightarrow{c}, \overrightarrow{c} + \overrightarrow{a}\right] = 2\left[\overrightarrow{a}, \overrightarrow{b}, \overrightarrow{c}\right]$$
.  
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12. Show that the position vector of the point P, which divides  
the line joining the points A and B having position vectors  
 $\overrightarrow{a}$  and  $\overrightarrow{b}$  internally in the ratio  $m:n$  is  $\frac{m\overrightarrow{b} + n\overrightarrow{a}}{m+n}$ 

**13.** Find the vector equation of the line, passing through the points (-1,0,2) and (3,4,6)

14. A die is tossed thrice. Find the probability of getting an odd

number tieast once.



2. If  

$$A = \begin{bmatrix} 0 & 6 & 7 \\ -6 & 0 & 8 \\ 7 & -8 & 0 \end{bmatrix}, B = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 2 \\ 1 & 2 & 0 \end{bmatrix} \text{ and } C = \begin{bmatrix} 2 \\ -2 \\ 3 \end{bmatrix}$$

Calculate AC, BC and (A+B)C. Also verify that (A+B)C=AC+BC.



**3.** Solve the following system of linear equations by matrix method:

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

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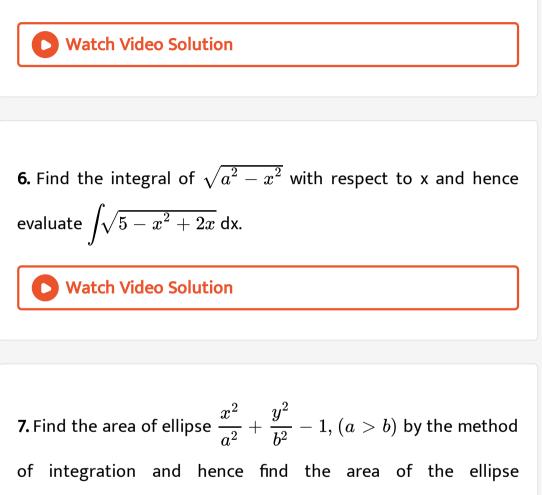
**4.** If y=3 cos(log x)+4 sin(log x), show that  $x^2y_2 + xy_1 + y = 0$ 



**5.** A ladder 5 m long is leaning against a well. The bottom of the ladder is pulled along the ground, away from the well, at the

rate of 2 m/s. How fat is its height on the wall decreasing when

the foot of the ladder is 4m away from the wall?



$$rac{x^2}{16} + rac{y^2}{19} = 1.$$

**8.** Find the general solution of the differential equation  $xrac{dy}{dx}+2y=x^2,\,(x
eq 0)$ 



**9.** Derive the equation of a plane in normal form both in the vector and Cartesian form .



10. If a fair coin is tossed 10 times, find the probability of.

(i) exactly six heads and (ii) atleast six heads.



Part E

1. Prove that 
$$\int_0^a f(x) dx = \int_0^a f(a-x) dx$$
 and hence evaluate

the following:

(c) 
$$\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$$

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$$\left| egin{array}{cccccc} a-b-c & 2a & 2a \ 2b & b-c-a & 2b \ 2c & 2c & c-a-b \end{array} 
ight| = (a+b+c)^3.$$