



MATHS

BOOKS - SHARAM PUBLICATION

MODEL QUESTION PAPER-3



1. Write fog, if $f \colon R o R$ and $g \colon R o R$ are given by

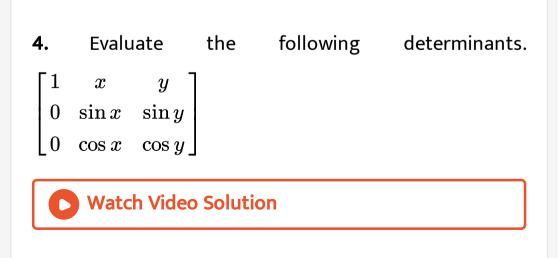
$$f(x)=8x^3 \,\, {
m and} \,\, g(x)=x^{1\,/\,3}.$$

2. write the principal value of $\sin^{-1}\left[\sin\left(\frac{3\pi}{5}\right)\right]$.

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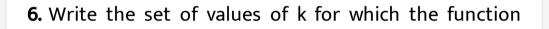
3. If
$$\begin{bmatrix} a+4 & 3b \\ 8 & -6 \end{bmatrix} = \begin{bmatrix} 2a+2 & b+2 \\ 8 & a-8b \end{bmatrix}$$
 then write

the value if a-2b .



5. What is
$$\frac{dy}{dx}$$
 at $t = \frac{3\pi}{4}$ when $x = a \cos^3 t$, and $y = a \sin t$.





 $f(x) = kx - \sin x$ is increasing.



7. Write the value of
$$\int \frac{x + \cos 6x}{3x^2 + \sin 6x} dx$$
.

8. Find the particular solution of the differential equation $\frac{dy}{dx} = 3x$, given that y = 0 when x = 0.

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9. If
$$\overrightarrow{a}$$
 and \overrightarrow{b} are unit vectors and $\overrightarrow{a} + \overrightarrow{b}$ is also a unit vector, then write the measure of the angle between \overrightarrow{a} and \overrightarrow{b}

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10. If the cartesian equation of a line is $\frac{3-x}{5} = \frac{y+4}{7} = \frac{2z-6}{4}$ then write the corresponding vector equation of the line.



11. If Z is the set of all integers and R is the relation on Z defined as $R=\{(a,b)\!:\!a,b\in Z ext{ and } a-b ext{ is divisible}$

by 3. Prove that R is an equivalence relation.



12. If A = {1, 2, 3}, B = {4, 5, 6, 7} and f = {(1, 4), (2, 5), (3, 6)}

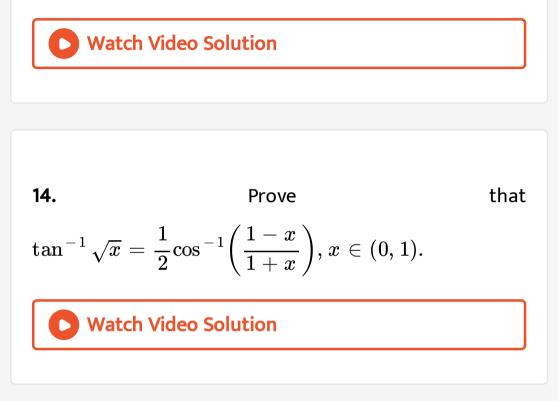
is a function from A to B. State whether f is one-one or

not.



13. if * is the binary operation on N given by a * b = L.C.

M of a and b. Find 20 * 16. Is * Commutative.



15. Sole the following LPP graphically

Maximise $Z=6x_1+7x_2$

Subject to $x_1+2x_2\geq 2, x_1, x_2\geq 0.$

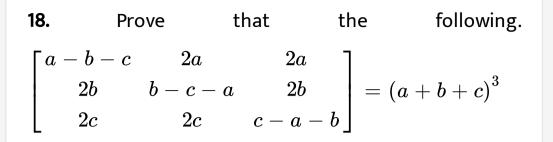
16. If
$$A = \begin{bmatrix} 1 & -2 & 2 \\ 3 & 1 & -1 \end{bmatrix}$$
 and $B = \begin{bmatrix} 2 & 4 \\ 1 & 2 \\ 3 & -1 \end{bmatrix}$, then

verify that $\left(AB
ight)^T=B^TA^T.$

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17. Using elementary operation find the inverse of $\begin{bmatrix} 2 & 3 \\ 5 & 7 \end{bmatrix}$





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19. Prove the following:

$$egin{bmatrix} b^2-ab&b-c&bc-ac\ ab-a^2&a-b&b^2-ab\ bc-ac&c-a&ab-a^2 \end{bmatrix}=0$$

20. Find the value of k if the function f(x) defined by

$$f(x) = egin{cases} 2x-1 & when x < 2 \ k & when x = 2 ext{ is continous at x=2.} \ x+1 & when x > 2 \end{cases}$$

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21. If
$$y = \log \left[x + \sqrt{x^2 + 1} \right]$$
, then prove that $(x^2 + 1) \frac{d^2 y}{dx^2} + x \frac{dy}{dx} = 0.$
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22. If sin y = x sin (a + y) then show that $\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin a}$





23. Find the equations of the tangent to the curve

$$x=\sin 3t, y=\cos 2t$$
 at $t=rac{\pi}{4}$

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24. If f(x) = a In
$$x + bx^2 + x$$
 has extreme values at

x = -1 and x = 2 then find a and b.

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25. Evaluate the following integrals :

$$\int \frac{\cos^{-1} x}{\sqrt{1-x^2}} dx.$$



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26. Evaluate
$$\int (\sin x - \cos x) dx$$
.

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27. Prove that
$$\int_{0}^{\frac{\pi}{2}} \ln \sin x dx = \frac{\pi}{2} \ln \left(\frac{1}{2} \right)$$

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28. Determine the area the of the region between the curves $y=\cos x$ and $y=\sin x$, bounded by x = 0.

29. Solve the differential equation $(1+x^2)\frac{dy}{dx} + y = \tan^{-1}x$

30. Show by vector method that the line joining the points (1, 4, 2) and (-1, 1, -2) is perpendicular to the line joining the points (2, -3, 4) and (5, 3, -2).

31. Find the co-ordinates of the point where the perpendicular from the origin meets the line joining the points (-9, 4, 5) and (11, 0, -1).

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32. Find the equation of the plane passing through the

line x = y = z and the point (3,2,1).

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33. Find the co-ordinates of the point where the $\frac{x-2}{3} = \frac{y+1}{4} = \frac{z-2}{2}$ intersect the plane

x - y + z - 5 = 0. Also find the angle between the line

and the plane.

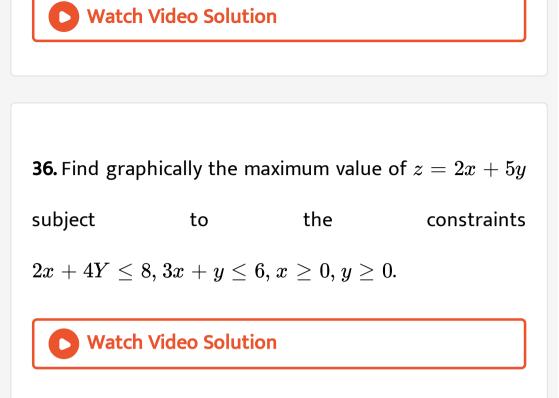


34. Show that the relation S defined on set N imes N by $(a, b)S(c, d) \Rightarrow a + d = b + c$ is an equivalence relation.

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35. Solve for x,

$$an^{-1}igg(rac{2x}{1-x^2}igg) + \cot^{-1}igg(rac{1-x^2}{2x}igg) = rac{\pi}{3}, \ -1 < x < 1$$



37. Find the values of a and b such that the function f

defined by
$$f(x)= egin{cases} ax^2+b & ext{ if } x<1\ 1 & ext{ if } x=1.\ 2ax+b & ext{ if } x>1 \end{cases}$$

38. Use the function f(x) = $x^{rac{1}{x}}, x > 0$ to show that e^pi

)grt pi^e.

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

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40. Evaluate $\int_0^{\pi} \frac{x}{1+\sin x} dx$
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41. Find the solution of the following differential equations:

(2x+y+1)dx+(4x+2y-1)dy=0

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42. If $\overrightarrow{a}, \overrightarrow{b}$ and \overrightarrow{c} are three vectors such that $\left|\overrightarrow{a}\right| = 3, \left|\overrightarrow{b}\right| = 4$ and $\left|\overrightarrow{c}\right| = 5$ and each one of these is perpendicular to the sum of other two, then find $\left|\overrightarrow{a} + \overrightarrow{b} + \overrightarrow{c}\right|$.

43. Find the coordinates of foot of perpendicular drawn

from the point (0, 2, 3) on the line $\frac{x+3}{5} = \frac{y-1}{2} = \frac{z+4}{3}$. Also, find the length of

perpendicular.

