

1. If  $\log_x y = z$  and  $\log_z y = x$   
then  $x$  and  $z$  are related by the formula

- A  $x^x = z^z$
- B  $x^z = z^x$
- C  $x^{xz} = z$
- D  $x^{xz} = x$
- D  $x + z = xz$

2. P, Q, R and S are points such that  
→ PQ represents  $\begin{pmatrix} 2 \\ 3 \\ 5 \end{pmatrix}$ , RS represents  $\begin{pmatrix} l \\ m \\ n \end{pmatrix}$

and PQ is parallel to RS.  
Which of the following must be true?

- (1)  $l = 2$
- (2)  $l : m = 2 : 3$
- (3)  $2l + 3m + 5n = 0$

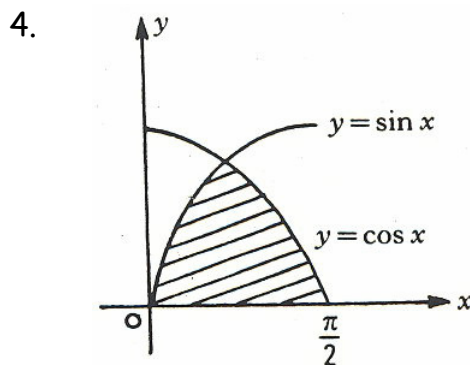
- A (1) only
- B (2) only
- C (3) only
- D (1) and (2) only
- E None of (1), (2) and (3)

3. Which of the following values of  $x$  and  $y$  make the vectors.

$\begin{pmatrix} x \\ y \\ 7 \end{pmatrix}$  and  $\begin{pmatrix} -3 \\ 2 \\ -1 \end{pmatrix}$  perpendicular?

- (1)  $x = 2, y = \frac{1}{2}$
- (2)  $x = -1, y = 2$
- (3)  $x = 1, y = 5$

- A (1) only
- B (2) only
- C (1) and (3) only
- D (2) and (3) only
- E (1), (2) and (3)



The diagram shows the curves  $y = \sin x$  and  $y = \cos x$  for  $0 < x < \pi/2$ .  
The shaded area is given by

- A  $\int_0^{\pi/4} \sin x \, dx + \int_{\pi/4}^{\pi/2} \cos x \, dx$
- B  $\int_0^{\pi/4} \cos x \, dx + \int_{\pi/4}^{\pi/2} \sin x \, dx$
- C  $\int_0^{\pi/2} (\cos x - \sin x) \, dx$
- D  $\int_0^{\pi/2} (\sin x - \cos x) \, dx$
- E  $\int_0^{\pi/2} (\sin x + \cos x) \, dx$

5.  $f(x) = \cos(2x - 1)$ ;  $f^{-1}(x)$  is

- A  $\sin(2x - 1)$
- B  $2 \sin(2x - 1)$
- C  $-\sin(2x - 1)$
- D  $-2 \sin(2x - 1)$
- E  $-2 \sin(2x - 1) \cos(2x - 1)$

6. Given that  $y = 100x^7$ , then  $\log_{10} y$  equals

- A  $7 \log_{10} x$
- B  $7 \log_{10} x + 2$
- C  $7 \log_{10} x + 100$
- D  $100 \log_{10} x + \log_{10} 7$
- E  $100 \log_{10} x + 7$

7. P is the point (1, 2, 3) referred to mutually perpendicular axes OX, OY and OZ. The tangent of the angle which OP makes with the plane OXY is

- A  $\frac{1}{\sqrt{14}}$
- B  $\frac{1}{\sqrt{13}}$
- C  $\frac{2}{\sqrt{10}}$
- D  $\frac{3}{\sqrt{14}}$
- E  $\frac{3}{\sqrt{5}}$

8. Given that  $2 \cos \theta - \sin \theta = r \cos (\theta - x)$ , where  $r > 0$ , then the values of  $r$  and  $\cos x$  are respectively

- A  $5, \frac{1}{5}$
- B  $\frac{1}{\sqrt{5}}, \frac{1}{\sqrt{5}}$
- C  $\frac{1}{\sqrt{5}}, \frac{2}{\sqrt{5}}$
- D  $\sqrt{5}, \frac{1}{\sqrt{5}}$
- E  $\sqrt{5}, \frac{2}{\sqrt{5}}$

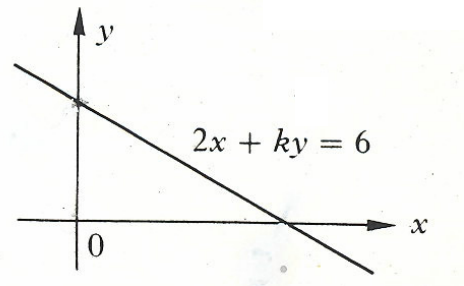
9. If  $X = \frac{4 + \sqrt{3}}{\sqrt{2}}$  and  $Y = \frac{4 - \sqrt{3}}{\sqrt{2}}$

which of the following is/are true?

- (1)  $X + Y = 4\sqrt{2}$
- (2)  $X - Y = \sqrt{6}$
- (3)  $XY = \frac{1}{2}$

- A (1) and (2) only
- B (1) and (3) only
- C (2) and (3) only
- D (1), (2) and (3)
- E (1) only or (2) only or (3) only

10.



The area of the triangle bounded by the coordinate axes and the line  $2x + ky = 6$ , where  $k > 0$ , is  $k$  square units. The value of  $k$  is

- A 2
- B 3
- C 6
- D 9
- E 18