

# FUNCTIONS

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1. The interval in which the function  $f$  given by  $f(x) = x^2 e^{-x}$  is strictly increasing, is
  - (a)  $(-\infty, \infty)$
  - (b)  $(-\infty, 0)$
  - (c)  $(2, \infty)$
  - (d)  $(0, 2)$
2. The function  $f(x) = \frac{x-1}{x(x^2-1)}$  is discontinuous at
  - (a) exactly one point
  - (b) exactly two points
  - (c) exactly three points
  - (d) no points
3. The function  $f : \mathbb{R} \rightarrow [-1, 1]$  defined by  $f(x) = \cos x$  is
  - (a) both one-one and onto
  - (b) not one-one, but onto
  - (c) one-one, but onto
  - (d) neither one-one, nor onto
4. The range of the principal value branch of the function  $y = \sec^{-1} x$  is
5. The principal value of  $\cos^{-1}\left(\frac{-1}{2}\right)$  is

6. Find the value of  $k$ , so that the function  $f(x) = \begin{cases} kx^2 + 5 & \text{if } x \leq 1, \\ 2 & \text{if } x > 1 \end{cases}$  is continuous at  $x = 1$ .

7. Check whether the relation  $\mathbb{R}$  in the set  $\mathbb{N}$  of natural numbers given by

$$\mathbb{R} = \{(a, b) : a \text{ is divisor of } b\} \quad (1)$$

is reflexive, symmetric or transitive. Also determine whether  $\mathbb{R}$  is an equivalence relation.

8. Prove that :

$$\tan^{-1} \frac{1}{4} + \tan^{-1} \frac{2}{9} = \frac{1}{2} \sin^{-1} \left( \frac{4}{5} \right) \quad (2)$$