**Question 13:** Which of the following functions have a finite number of points of discontinuity in R ([.] represents the greatest integer function)?

A) tanx

B) x[x]

C) |x| / x

D) sin[πx]

**Solution:**

f (x) = tanx is discontinuous when x = (2n + 1) π / 2, n ∈ Z

f (x) = x[x] is discontinuous when x = k, k ∈ Z

f (x) = sin [nπx] is discontinuous when nπx = k, k ∈ Z

Thus, all the above functions have an infinite number of points of discontinuity. But, if (x) = |x| / x is discontinuous when x = 0 only.

**Question 14:** The number of values of x ∈ [0, 2] at which f (x) = |x − [1 / 2]| + |x − 1|+ tanx is not differentiable is

A) 0

B) 1

C) 3

D) None of these

**Solution:**

|x − [1 / 2]| is continuous everywhere but not differentiable at x = 1 / 2, |x − 1| is continuous everywhere, but not differentiable at x = 1 and tan x is continuous in [0, 2] except at x = π / 2. Hence, f (x) is not differentiable at x = 1 / 2, 1, π / 2.

**Question 15:**

$\lim_{x\to\pi/2}(\sec\theta-\tan\theta)=$

**Solution:**

$\lim_{\theta\to\pi/2}\ \frac{1-\sin\theta}{\cos\theta}=\lim_{\theta\to\pi/2}\ \frac{\left(\cos\frac{\theta}{2}-\sin\frac{\theta}{2}\right)^2}{\left(\cos\frac{\theta}{2}-\sin\frac{\theta}{2}\right)\left(\cos\frac{\theta}{2}+\sin\frac{\theta}{2}\right)}=0$