**1.** The value(s) of $x$ for which the function $f(x)=\begin{cases} 1-x & , \quad x<1 \\ (1-x)(2-x) & , \quad 1 \leq x \leq 2 \\ 3-x & , \quad x>2 \end{cases}$ fails to be continuous is (are)

(1) 1
(2) 2
(3) 3
(4) All real numbers

**2.** If the function $f(x)=\begin{cases} \frac{\left(e^{kx}-1\right)\tan kx}{4x^2}, & x \neq 0 \\ 16, & x=0 \end{cases}$ is continuous at $x=0$, then $k=\ldots$.

(1) $\pm\frac{1}{8}$
(2) $\pm 4$
(3) $\pm 2$
(4) $\pm 8$

**3.** If $f(x)=\begin{cases} \frac{\sqrt{4+ax}-\sqrt{4-ax}}{x}, & -1 \leq x<0 \\ \frac{3x+2}{x-8}, & 0 \leq x \leq 1 \end{cases}$ is continuous in $[-1, 1]$ then value of a is

(1) 1
(2) $-1$
(3) $1/2$
(4) $-1/2$

**4.** The number of points of discontinuity of the function $f(x)=x-[x]$ in the interval $(0,7)$ are, where $[\cdot]$ is the greatest integer function.

(1) 2
(2) 4
(3) 6
(4) 8

**5.** Let $y=\frac{1}{u^2+u-2}$ where $u=\frac{1}{x-1}$ then $y$ is discontinuous only at $x=$

(1) 1, 2
(2) 1, $-2$
(3) 1, $\frac{1}{2}$, 2
(4) None of these

**6.** If $f(x)=\begin{cases} \frac{\sin(p+1)x+\sin x}{x} & , \quad x<0 \\ q & , \quad x=0 \\ \frac{\sqrt{x+x^2}-\sqrt{x}}{x^{3/2}} & , \quad x>0 \end{cases}$ is continuous at $x=0$ , then the ordered pair $(p, q)$ is equal to:

(1) $\left(-\frac{3}{2},-\frac{1}{2}\right)$
(2) $\left(-\frac{1}{2}, \frac{3}{2}\right)$
(3) $\left(\frac{5}{2}, \frac{1}{2}\right)$
(4) $\left(-\frac{3}{2}, \frac{1}{2}\right)$

**7.** Let $f\left(x\right)=\lim_{n\to\infty}\frac{\log(2+x)-x^{2n}\sin x}{1+x^{2n}}$ . Then

(1) $f$ is continuous at $x=1$
(2) $\lim_{x\to1^+} f\left(x\right)=\log 3$
(3) $\lim_{x\to1^+} f\left(x\right)=-\sin 1$
(4) $\lim_{x\to1^-} f\left(x\right)$ does not exist

**8.** The function $f(x)=x-\left|x-x^2\right|$ is

(1) Continuous at $x=1$
(2) Discontinuous at $x=1$
(3) Not defined at $x=1$
(4) None of the above

**9.** Match the following

| Column – I | Column - II |
|---|---|
| (a) $f(x)=\left\|x^3\right\|$ is | (p) Continuous in (-1, 1) |
| (b) $f(x)=\sqrt{\|x\|}$ is | (q) Differentiable in (-1, 1) |
| (c) $f(x)=\left\|\sin^{-1} x\right\|$ is | (r) Differentiable in (0, 1) |
| (d) $f(x)=\cos^{-1}\|x\|$ is | (s) Not differentiable at least one point in (-1, 1) |

(1) A(p, q, r), B(p, r, s), C(p, r, s), D(p, r, s)
(2) A(p, r, q), B(r, p, s), C(q, r, s), D(s, q, p)
(3) A(s, q, r), B(p, r, q), C(p, r, p), D(s, r, p)
(4) A(p, s, r), B(s, p, q), C(s, p, r), D(q, s, r)

**10.** Let $f: R \rightarrow R$ be a function defined by $f(x)=\min\{x+1, |x|+1\}$. then which of the following is true?

(1) $f(x)$ is differentiable everywhere
(2) $f(x)$ is not differentiable at $x=0$
(3) $f(x) \geq 1$ for all $x \in R$
(4) $f(x)$ is not differentiable at $x=1$