1. The derivative of the function $f(x)=x|x|$ at $x=0$

(1) does not exist
(2) exists and is equal to 0
(3) exists and is equal to 1
(4) None of these

2. The number of points of discontinuity of $f(x)=[x^3+1]$ in $(1,2)$ is/are (where [.] denotes Greatest Integer Function)

(1) 1
(2) 6
(3) 5
(4) 4

3. If $f(x)=\begin{cases}\frac{e^{[x]+|x|}-1}{[x]+|x|} & : x\neq 0\\ -1 & : x=0\end{cases}$ (where [.] denotes the greatest integer function), then

(1) $f(x)$ is continuous at $x=0$
(2) $\lim_{x\to 0^+} f(x)=-1$
(3) $\lim_{x\to 0^-} f(x)=1$
(4) $\lim_{x\to 0^+} f(x)=1$

4. For the function $f(x)=\begin{cases}\frac{1-x}{|x-1|} & : x<1\\ 1 & : x=1\\ x^2 & : x>1\end{cases}$ following are true

(1) continuous at all points except at $x=1$.
(2) differentiable at all points.
(3) differentiable at all points except at $x=1$.
(4) none of these.

5. Let $f(x)=\begin{cases}x^2 & \text{if } x\le x_0\\ ax+b & \text{if } x>x_0\end{cases}$

The values of the coefficients a and b for which the function is continuous and has a derivative at x_0 , are

(1) $a=x_0,\ b=-x_0$
(2) $a=2x_0,\ b=-x_0^2$
(3) $a=x_0^2,\ b=-x_0$
(4) $a=x_0,\ b=-x_0^2$

6. If $f(x)=\begin{cases}3^x, & -1\le x\le 1\\ 4-x, & 1<x<4\end{cases}$, then at x = 1, f(x) will be :

(1) Continuous but not differentiable
(2) Neither continuous nor differentiable
(3) Continuous and differentiable
(4) Differentiable but not continuous

7. If $f(x)=\begin{cases}e^x; x\le 0\\ |1-x|; x>0\end{cases}$, then

(1) $f(x)$ is differentiable at $x=0$.
(2) $f(x)$ is continuous at $x=0$.
(3) $f(x)$ is differentiable at $x=1$.
(4) $f(x)$ is not continuous at $x=1$.

8. If $f(x)=\begin{cases}x^3, & x^2<1\\ x, & x^2\ge 1\end{cases}$, then $f(x)$ is differentiable at

(1) $(-\infty,\infty)$-$\{1\}$
(2) $(-\infty,\infty)$-$\{1,-1\}$
(3) $(-\infty,\infty)$-$\{1,-1,0\}$
(4) $(-\infty,\infty)$-$\{-1\}$

9. Consider the function $f(x)=\min\{|x^2-4|,|x^2-1|\}$, then the number of points where $f(x)$ is non-differentiable is/are

(1) 0
(2) 7
(3) 6
(4) 4

10. The number of points at which the function $f(x)=(|x-1|+|x-2|+\cos x)$ where $x\in[0,\ 4]$ is not continuous, is

(1) 1
(2) 2
(3) 3
(4) 0