SATPREP

Assignment : ***Differentiability***

1. Determine if $f(x)=\sqrt[3]{x^2}$ is differentiable or not.

2. Determine if $f(x)=\begin{cases}\sin^{-1}x, & \text{if } -1\le x<1\\ \ln x, & \text{if } x\ge 1\end{cases}$ is differentiable or not.

3. Determine if $f(x)=\begin{cases}x^2-2x+1, & \text{if } x\le 1\\ \ln x, & \text{if } x>1\end{cases}$ is differentiable or not.

4. Determine if $f(x)=\begin{cases}x^2+2x-5, & \text{if } x\le 1\\ x^3+x-4, & \text{if } x>1\end{cases}$ is differentiable or not.

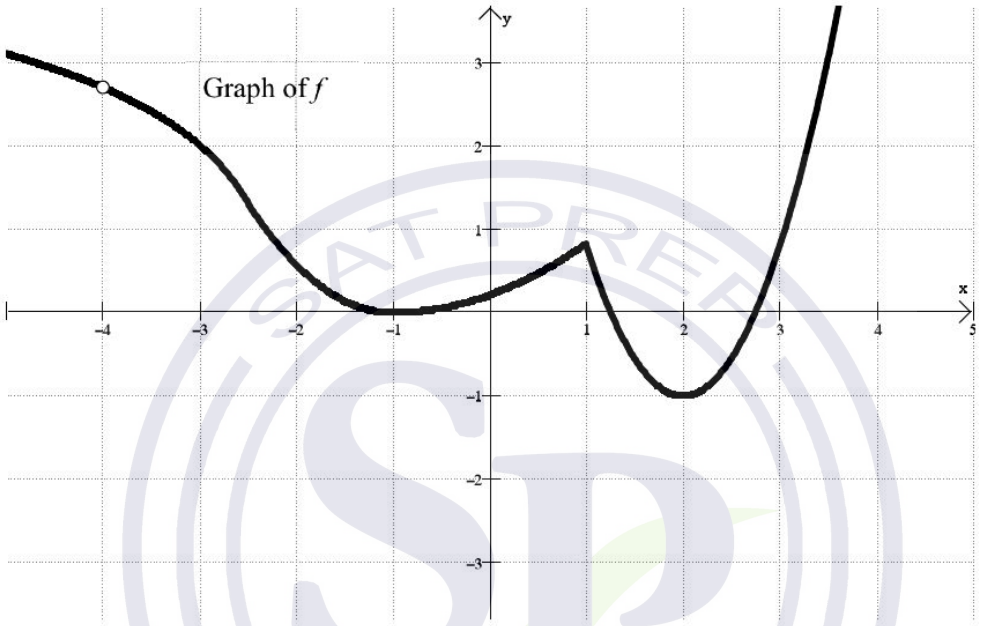
5. Given that $f(x)=\begin{cases}mx+2, & \text{if } x\le 1\\ k\ln x, & \text{if } x>1\end{cases}$ is differentiable at $x = 1$, find m and k.

6. Given that $f(x)=\begin{cases}mx-5, & \text{if } x\le -2\\ kx^2+1, & \text{if } x>-2\end{cases}$ is differentiable at $x = -2$, find m and k.

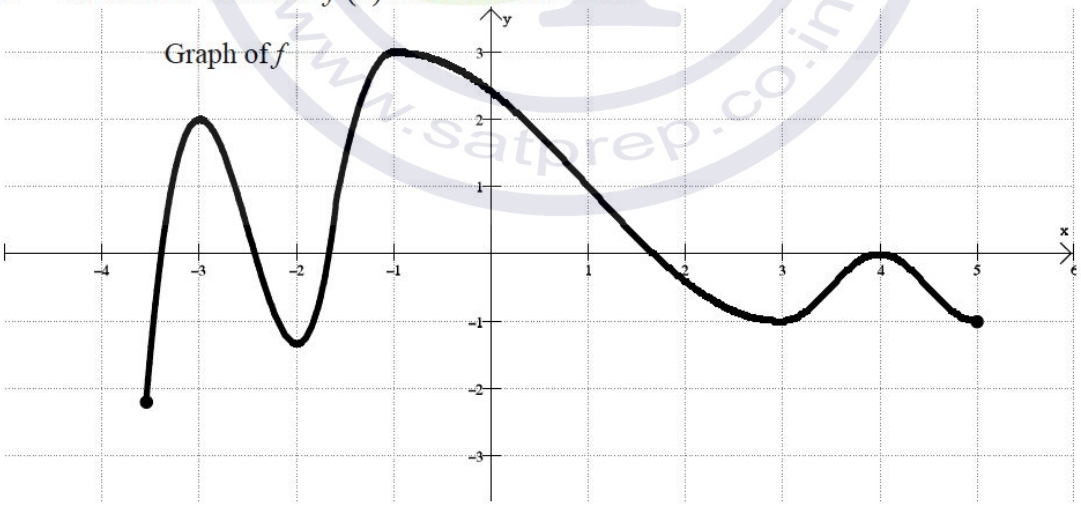
7. Given that $f(x)=\begin{cases}ke^{2x}, & \text{if } x\le 0\\ 3-mx, & \text{if } x>0\end{cases}$ is differentiable at $x = 0$, find m and k.

8. Given that $f(x)=\begin{cases}mx-2, & \text{if } x\le 2\\ k\sqrt{x^2-3}, & \text{if } x>2\end{cases}$ is differentiable at $x = 2$, find m and k.

9. At what x values is $f(x)$ not differentiable.



10. At what x values is $f(x)$ not differentiable.



Answer :

1. Not differentiable, $\frac{dy}{dx}$ *dne*.
2. Not continuous.
3. Not differentiable, $f'(1^-) \neq f'(1^+)$.
4. Differentiable
5. $m=-2,\ k=-2$
6. $m=-6,\ k=\frac{3}{2}$
7. $m=-6,\ k=3$
8. $m=\frac{4}{3},\ k=\frac{2}{3}$
9. Not differentiable
10. Not differentiable