Subject:Mathematics WORKSHEET(Continuity) Date:

1. Examine the continuity of the function $f(x)=\begin{cases}1+x; x\le 2\\ 5-x; x>2\end{cases}$ at x=2.
2. Show that the function $f(x)=\{2x-|x|$ is continuous at x=0.
3. Discuss the continuity of the function: $f(x)=\begin{cases}\dfrac{e^x-1}{\log(1+2x)}, x\neq 0\\ 7, x=0\end{cases}$

   at the point x=0 .
4. Examine the continuity of the functions at x=0

   (i) $f(x)=\begin{cases}\dfrac{x}{\sin 3x}, x\neq 0\\ 3, x=0\end{cases}$ (ii) $f(x)=\begin{cases}\dfrac{\sin 2x}{\sin 3x}, x\neq 0\\ 2.x=0\end{cases}$
5. Determine the constants if the given functions are continuous at specified points

   (i) $f(x)=\begin{cases}ax+5; x\le 2\\ x-1, x>2\end{cases}$ at x=2 (ii) $f(x)=\begin{cases}\dfrac{x^2-3x+2}{x-1}, x\neq 1\\ k, x=1\end{cases}$ at x=1
6. Find the value of a,b and c for which the function is continuous at x=0.

$$f(x)=\begin{cases}\dfrac{\sin(a+1)x+\sin x}{x}, x<0\\ c, x=0\\ \dfrac{\left(x+bx^2\right)^{1/2}-x^{1/2}}{bx^{3/2}}, x>0\end{cases}$$

7. Find the derivative of the function with respect to x

   (i) $e^{\tan^{-1}(\cos\sqrt{x})}$ (ii) $\log\left(\dfrac{x^2+x+1}{x^2-x+1}\right)+\dfrac{2}{\sqrt{3}}\tan^{-1}\dfrac{\sqrt{3}x}{1-x^2}$
8. If $y=x\log\left(\dfrac{x}{a+bx}\right)$, show that $x^3\dfrac{d^2y}{dx^2}=\left(x\dfrac{dy}{dx}-y\right)^3$
9. If $y=3\cos t-\cos 3t$, $x=3\sin t-\sin 3t$,find $\dfrac{d^2y}{dx^2}$ at $t=\dfrac{\pi}{3}$
10. If $ax^2+2hxy+by^2=1$, show that $\dfrac{d^2y}{dx^2}=\dfrac{h^2-ab}{(hx+by)^3}$