

# Doon Public School

A Senior Secondary School  
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Assignment – 2

Subject: Mathematics

Class: XII

Date: 22-05-2018

1. Determine if  $f$  defined by  $f(x) = \begin{cases} x^2 \sin\left(\frac{1}{x}\right) & x \neq 0 \\ 0 & x = 0 \end{cases}$  is a continuous function.
2. Show that the function  $f(x) = \frac{\sin x}{|x|}$  is discontinuous at  $x = 0$ .
3. Show that  $f(x) = \begin{cases} \frac{|x-a|}{x-a} & x \neq a \\ 1 & x = a \end{cases}$  is discontinuous at  $x = a$ .
4. Show that the function  $f(x) = 2x - |x|$  is continuous at  $x = 0$ .
5. Let  $f$  be the function defined by  $f(x) = \frac{2x}{\sqrt{a+x} - \sqrt{a-x}}$ ,  $x \neq 0$  and  $a > 0$ . What choice, if any, of  $f(0)$  will make it continuous at  $x = 0$ ?
6. Given that  $f(x) = \begin{cases} x^2 + 3x + a & x \leq 1 \\ bx + 2 & x > 1 \end{cases}$  is everywhere differentiable, find values of  $a$  and  $b$ .
7. Discuss the differentiability of  $f(x) = |x-1| + |x-2|$ .
8. Show that the function  $f(x) = \begin{cases} x \sin\left(\frac{1}{x}\right) & x \neq 0 \\ 0 & x = 0 \end{cases}$  is continuous but not differentiable at  $x = 0$ .