



Continuity Ex 9.1 Q11

We want to check the continuity at  $x = 1$ .

$$\text{LHL} = \lim_{x \rightarrow 1^-} f(x) = \lim_{h \rightarrow 0} f(1-h) = \lim_{h \rightarrow 0} 1 + (1-h)^2 = \lim_{h \rightarrow 0} 1 + 1 - 2h + h^2 = 2$$

$$\text{RHL} = \lim_{x \rightarrow 1^+} f(x) = \lim_{h \rightarrow 0} f(1+h) = \lim_{h \rightarrow 0} 2 - (1+h) = 1$$

$\text{LHL} \neq \text{RHL}$

Hence, the function is discontinuous at  $x = 1$

This is discontinuity of I<sup>st</sup> kind.

Continuity Ex 9.1 Q12

We want to check the continuity at  $x = 0$ .

$$\text{LHL} = \lim_{x \rightarrow 0^-} f(x) = \lim_{h \rightarrow 0} f(0-h) = \lim_{h \rightarrow 0} \frac{\sin(3 \times (-h))}{\tan(2 \times (-h))} = \lim_{h \rightarrow 0} \frac{-\sin 3h}{-\tan 2h} = \lim_{h \rightarrow 0} \frac{\frac{\sin 3h}{3h} \times 3h}{\frac{\tan 2h}{2h} \times 2h} = \frac{3}{2}$$

$$\text{RHL} = \lim_{x \rightarrow 0^+} f(x) = \lim_{h \rightarrow 0} f(0+h) = \lim_{h \rightarrow 0} \frac{\log(1+3h)}{e^{2h}-1} = \lim_{h \rightarrow 0} \frac{\frac{\log(1+3h)}{3h} \times 3h}{\frac{e^{2h}-1}{2h} \times 2h} = \frac{3}{2}$$

$$f(0) = \frac{3}{2}$$

$$\text{Thus, LHL} = \text{RHL} = f(0) = \frac{3}{2}$$

Hence, the function is continuous at  $x = 0$

Continuity Ex 9.1 Q13

We want to check the continuity of the function at  $x = 0$ .

$$\text{LHL} = \lim_{x \rightarrow 0^-} f(x) = \lim_{h \rightarrow 0} f(0-h) = \lim_{h \rightarrow 0} 2(-h) - |-h| = \lim_{h \rightarrow 0} -2h - h = 0$$

$$\text{RHL} = \lim_{x \rightarrow 0^+} f(x) = \lim_{h \rightarrow 0} f(0+h) = \lim_{h \rightarrow 0} 2h - |h| = 0$$

$$f(0) = 0$$

$$\text{Thus, LHL} = \text{RHL} = f(0) = 0$$

Hence, the function is continuous at  $x = 0$

Continuity Ex 9.1 Q14

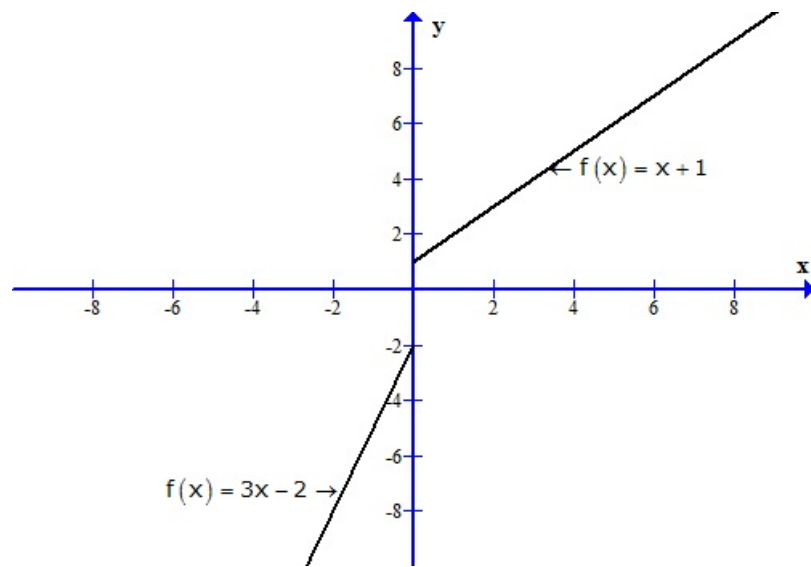
We want to check the continuity of the function at  $x = 0$ .

$$\text{LHL} = \lim_{x \rightarrow 0^-} f(x) = \lim_{h \rightarrow 0} f(0-h) = \lim_{h \rightarrow 0} 3(-h) - 2 = \lim_{h \rightarrow 0} -3h - 2 = -2$$

$$\text{RHL} = \lim_{x \rightarrow 0^+} f(x) = \lim_{h \rightarrow 0} f(0+h) = \lim_{h \rightarrow 0} h + 1 = 1 \neq 0$$

$\text{LHL} \neq \text{RHL}$

So, the function is discontinuous



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