Continuity Ex 9.1 Q19

We have that the function is continuous at $x = 1$

$\therefore$ LHL = RHL = $f(1)$ ....(1)

Now,

$$\text{LHL} = \lim_{x \to 1^-} f(x) = \lim_{h \to 0} f(1-h) = \lim_{h \to 0} \frac{(1-h)^2 - 3(1-h) + 2}{(1-h) - 1} = \lim_{h \to 0} \frac{h^2 + h}{-h} = \lim_{h \to 0} -h - 1 = -1$$

$f(1) = k$

From (1), we get,

$k = -1$

Continuity Ex 9.1 Q20

We know that a function is continuous at 0 if

LHL = RHL = $f(0)$ ....(1)

Now,

$$\text{LHL} = \lim_{x \to 0^-} f(x) = \lim_{h \to 0} f(0-h) = \lim_{h \to 0} \frac{\sin 5(-h)}{3(-h)} = \lim_{h \to 0} \frac{-\sin 5h}{-3h} = \lim_{h \to 0} \frac{\sin 5h}{5h} \times \frac{5h}{3h} = \frac{5}{3}$$

$f(0) = k$

Thus, from (1),

$k = \frac{5}{3}$

Continuity Ex 9.1 Q21

The given function is $f(x) = \begin{cases} kx^2, & \text{if } x \le 2 \\ 3, & \text{if } x > 2 \end{cases}$

The given function f is continuous at $x = 2$, if f is defined at $x = 2$ and if the value of f at $x = 2$ equals the limit of f at $x = 2$

It is evident that f is defined at $x = 2$ and $f(2) = k(2)^2 = 4k$

$$\lim_{x \to 2^-} f(x) = \lim_{x \to 2^+} f(x) = f(2)$$
$$\Rightarrow \lim_{x \to 2^-} (kx^2) = \lim_{x \to 2^+} (3) = 4k$$
$$\Rightarrow k \times 2^2 = 3 = 4k$$
$$\Rightarrow 4k = 3 = 4k$$
$$\Rightarrow 4k = 3$$
$$\Rightarrow k = \frac{3}{4}$$

Therefore, the required value of k is $\frac{3}{4}$.

Continuity Ex 9.1 Q22

We have given that the function is continuous at $x = 0$

So, LHL = RHL = $f(0)$.....(1)

Now,

$$\text{LHL} = \lim_{x \to 0^-} f(x) = \lim_{h \to 0} f(0-h) = \lim_{h \to 0} \frac{\sin 2(-h)}{5(-h)} = \lim_{h \to 0} \frac{-\sin 2h}{-5h} = \lim_{h \to 0} \frac{\sin 2h}{2h} \times \frac{2h}{5h} = \frac{2}{5}$$

$f(0) = k$

Using (1), $k = \frac{2}{5}$

*********** END **********