Exercise 2.5 (Q. 13-28)

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Continuity

⇒ At what points are the function in Question (13-30) continous ?

13) $y = \frac{1}{x-2} - 3x$

Sol.

$x - 2 = 0$

$\boxed{x = 2}$

Discontinous only when $x = 2$.

14) $y = \frac{1}{(x+2)^2} + 4$

Sol.

$(x+2)^2 = 0$

$\boxed{x = -2}$

Discontinous only when $x = -2$.

15) $y = \frac{x+1}{x^2 - 4x + 3}$

Sol.

$x^2 - 4x + 3$

$x^2 - 3x - x + 3$

$x(x-3) - 1(x-3)$

$(x-1)(x-3)$

$\boxed{x = 1}, \boxed{x = 3}$

Discontinous only when $x = 3$ or $x = 1$.

16) $y = \frac{x+3}{x^2 - 3x - 10}$

Sol.

$x^2 - 3x - 10$

$x^2 - 5x + 2x - 10$

$x(x-5) + 2(x-5)$

$(x+2)(x-5)$

$\boxed{x = -2}, \boxed{x = 5}$

Discontinous only when $x = -2$ or $x = 5$.

17) $y = |x-1| + \sin x$

Continous Everywhere.

As $|x-1| + \sin x$ define all the x.

18) $y = \frac{1}{|x|+1} - \frac{x^2}{2}$

Continous Everywhere As $|x| + 1 \neq 0$ for all x values.

19) $y = \frac{\cos x}{x}$

Discontinous only at $x = 0$

20) $y = \frac{x+2}{\cos x}$

Sol. Discontinous at odd integer multiples of $\frac{\pi}{2}$, i.e: $x = (2n-1)\frac{\pi}{2}$, n an integer but continous at all other x.

21) $y = \csc 2x$

$y = \frac{1}{\sin 2x} \Rightarrow \sin 2x \neq 0$

$2x \neq K\pi$

$x \neq \frac{K\pi}{2}$

Discontinous when $2x$ is an integer multiple of π. i.e: $2x = n\pi$, n an integer,

$x = \frac{n\pi}{2}$.

22) $y = \tan \frac{\pi x}{2}$

Discontinous when $\frac{\pi x}{2}$ is an odd integer multiple of $\pi/2$,

i.e: $\frac{\pi x}{2} \Rightarrow (2n-1)\frac{\pi}{2} \Rightarrow$

$x = 2n - 1$. Continous everywhere else

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23) $y = \frac{x \tan x}{x^2+1}$

Discontinous at odd integers multiple of $\frac{\pi}{2}$.

$x = (2n-1)\frac{\pi}{2}$,

n an integer, but continous at all values of x.

24) $y = \frac{\sqrt{x^4+1}}{1+\sin^2 x}$

Continous everywhere since $x^4+1 \geq 1$ and

$-1 \leq \sin x \leq 1 \Rightarrow$

$0 \leq \sin^2 x \leq 1 \Rightarrow$

$1+\sin^2 x \geq 1$;

limits exist and are equal to the function values.

25) $y = \sqrt{2x+3}$

$2x+3 \geq 0$

$2x \geq -3$

$\boxed{x \geq -\frac{3}{2}}$

Continous on the interval $[-\frac{3}{2}, \infty)$

26) $y = \sqrt[4]{3x-1}$

Sol

$3x-1 \geq 0$

$3x \geq 1$

$\boxed{x \geq \frac{1}{3}}$

Continous on the interval $[\frac{1}{3}, \infty)$

27) $y = (2x-1)^{1/3}$

Continous everywhere $(2x-1)^{1/3}$ is defined for all x, limit exist and are equal to function values.

28) $y = (2-x)^{1/5}$

Continous everywhere $(2-x)^{1/5}$ is defined for all x; limits exist and are equal to function values.