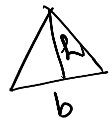
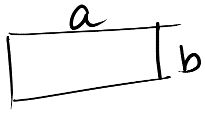
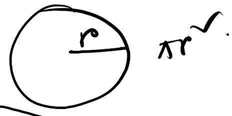


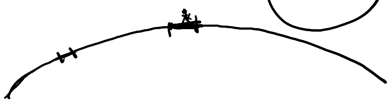
$\frac{1}{2} \times b \times h$.

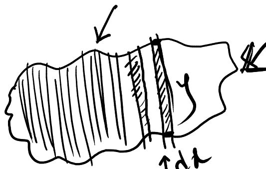


ab



πr^2

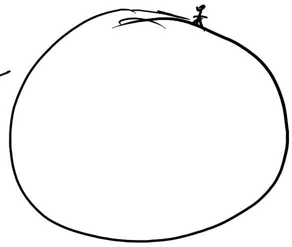


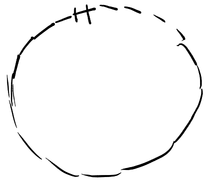


ক্ষেত্রফল = ?

$\sum y dx$ = ক্ষেত্রফল

অসীম ‖ = $\int y dx$



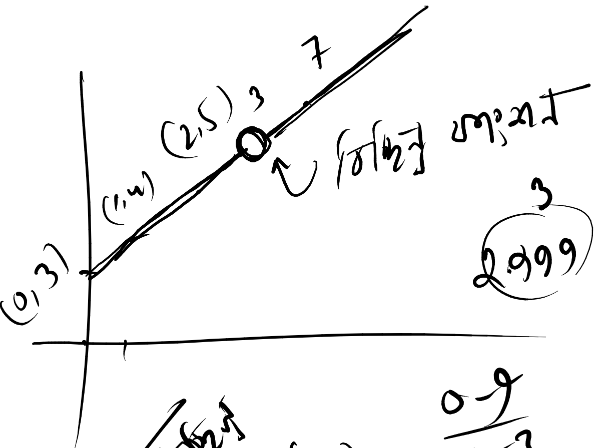


Differentiation =

integration $\int$

$\frac{9.1}{\cancel{9.8}\ \boxed{6.7}}$

Limit.



$f(x) = \frac{x^2-9}{x-3}$

$\frac{\cancel{(x+3)(x-3)}}{\cancel{(x-3)}} = x+3$

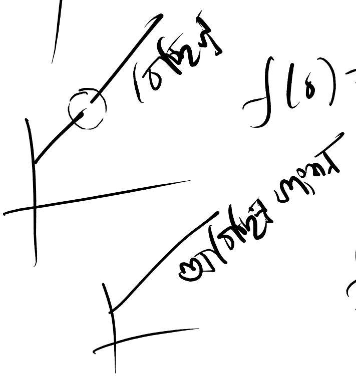
not allowed in functions

3

2.999   3.001.

$f(1) = \frac{1^2-9}{1-3}$

$f(3) = \frac{3^2-9}{3-3}$ = অসংজ্ঞায়িত = $\frac{0}{0}$



$f(0) = \frac{0-9}{0-3} = 3$

$f(1) = \frac{1-9}{1-3} = 4$

$f(2) = 5$

$f(3) =$ অসংজ্ঞায়িত

$f(4) = \frac{4^2-9}{4-3} = \frac{7}{1} = 7$

2.999 ✓

2.9999999 ✓

$x = 3 \rightarrow$ অসংজ্ঞায়িত

$x = 2.999 \rightarrow$ সংজ্ঞায়িত

$x = 3.001 \rightarrow$ সংজ্ঞায়িত

$f(3.1) = \frac{3.1^2-9}{3.1-3}$

0.1   = 6.1

$\boxed{3.000001}$

3.

3.

$f(x) = \frac{x^2-9}{x-3} = (x+3)$

$f(3.0001) = \frac{(3.0001)^2-9}{3.0001-3}$

0.0001

= 6.0001 ✓

$f(3) = 3+3 = 6$

6 কোটি

6.1 কোটি

10 লাখ

6.0001 যখন

$(x_2 - x)$ যত কম হবে, তাহলে result তত accurate হবে

$= \delta x$

$3 \rightarrow$ ০

Δx

x point এ $f(x)$ exist না করে,

$x - \delta x$ $\quad f(x - \delta x)$

$x + \delta x$ $\quad f(x + \delta x)$

$f(x)$

0.1 $\quad f(x - \delta x)$ $\quad f(x + \delta x)$

$\Delta x \to 0$ $\quad 0.1$

$\lim_{\Delta x \to 0} f(x + \delta x)$

$f(3.1) = 6.1$ $\quad f(2.9) = \frac{2.9^2 - 9}{2.9 - 3} = 5.9$

$f(3.0001) = 6.0001$ $\quad f(2.9999) = 5.9999$

0.0001 $\quad 6$ $\quad 0.0001$

$\lim_{\Delta x \to 0} f(x + \delta x)$ $\quad f(x - \delta x)$

ডানদিকের (3^+)

বামদিকের লিমিট (3^-)

$1.99 - 2$

$= -0.01$

2

$f(x) = \sqrt{x - 2}$

$\lim_{x \to 2^-} = \sqrt{2^- - 2}$

$= \sqrt{\text{negative}}$

= অসংজ্ঞায়িত

ডোমেইন / সংজ্ঞা

$\lim_{x \to 2^+} = \sqrt{2^+ - 2}$

$= \sqrt{\text{positive}}$

$=$ ✓

$$\lim_{x \to a} g(x) = m \qquad \lim_{x \to a} f(x) = l$$

① $$\lim_{x \to a} \left(g(x) + f(x) \right) = \lim_{x \to a} g(x) + \lim_{x \to a} f(x)$$

$\times$, $-$, $\div$

$+ \longrightarrow m + l$

$- \longrightarrow m - l$

$\times \longrightarrow ml$

$\div \longrightarrow m/l \qquad l \neq 0$

অসীম লিমিট:

অসীম limit:

$$\lim_{x \to a} f(x) = \infty$$

$$\lim_{x \to a} f(x) = -\infty$$

$f(x) = \frac{1}{x}$

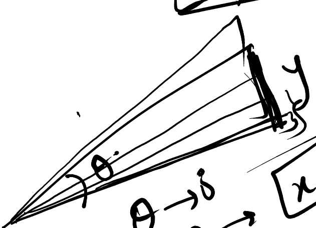
$\lim_{x \to 0} f(x) = \frac{1}{0} = \infty$

$f(x) = -\frac{1}{x}$

$\lim_{x \to 0} f(x) = -\frac{1}{0}$

$= -\infty$

Special limits:



$\theta \to 0$

$\theta \to$ $\boxed{x = \theta}$

$$\lim_{x \to 0} \frac{\sin x}{x} = 1$$

$x \to 0$ $\quad \sin x = x$

$\frac{\sin x}{x} = \frac{x}{x} = 1$

$\sin(0.0001) = 0.0000099$ $\quad 0.00000001$

$\sin\theta \approx \theta$ $\quad \boxed{\theta \to 0}$

$x = 0.0001$

$\frac{\sin(0.0001)}{0.0001} = \frac{9.99 \times 10^{-5}}{0.0001}$

$= .999 \approx 1$

$x = 0.000000001$

$$\boxed{\lim_{x\to 0} \frac{\sin x}{x} = 1}$$

① $x \to 0 \quad \cos x = 1$

$$\boxed{\lim_{x\to 0} \frac{\tan x}{x} = 1}$$

②

$$\lim_{x\to 0} \frac{\tan x}{x}$$

$$\frac{\sin x}{x} \times \frac{1}{\cos x}$$

$$= \lim_{x\to 0}$$

$$= \lim_{x\to 0} \frac{\sin x}{x} \times \lim_{x\to 0} \frac{1}{\cos x}$$

$$= 1 \times \frac{1}{\cos 0^\circ}$$

$$= 1 \times \frac{1}{1}$$

$$= 1$$

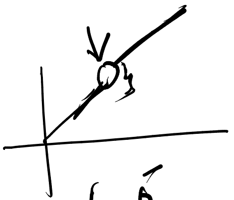
③ $\lim_{x\to 0} \frac{\ln(1+x)}{x} = 1$

④ $\lim_{x\to 0} (1+x)^{\frac{1}{x}} = e$

⑤ $\lim_{x\to 0} \frac{e^x - 1}{x} = 1$

⑥ $\lim_{x\to a} \frac{x^n - a^n}{x - a} = na^{n-1}$

[illegible]



$0^- \neq 0^+$

[illegible]

[illegible] $\begin{cases} 0^- \\ 0^+ \end{cases}$

$$f(x) = |x| = \begin{cases} -x, & x < 0 \\ \boxed{+x, \ x \geq 0} \end{cases}$$

[illegible]

[illegible]

$x = 0$ point ⓖ

$f(x^-) = f(0^-) = -0 = 0$

$f(x^+) = f(0^+) = +0 = 0$

$f(\bar{x})^{\emptyset} \equiv f(x^+)$

[illegible]

$x = 1$ point ⓖ

$f(1^-) = 1$

$f(1^+) = b$

[illegible]

$\cancel{f(2^-)}$

$f(2^+)$

$f(2)$ $f(2^-)$

$$f(x) = \begin{cases} 2 & x = 2 \\ \dfrac{x^2 \neq 4}{x-2} & x \neq 2 \end{cases}$$

x^-

x^+

$f(x)$ কি $x=2$ তে অবিচ্ছিন্ন?

$f(2)$ $f(2^+)$

$= 2$ $= ?$

$= \dfrac{x^2 \neq 4}{x-2} = \cancel{\dfrac{(x-2)(x+2)}{x-2}} = x+2 = 2+2 = 4$

বিচ্ছিন্ন

অসংজ্ঞাত

শর্ত $(<, >)$ $f(x^-) = f(x^+)$ অবিচ্ছিন্ন

$\neq$ বিচ্ছিন্ন

শর্ত $(=, \neq)$ $f(x) = f(x^+)$ অবিচ্ছিন্ন

$\neq$ বিচ্ছিন্ন

1^- 1^+

$$f(x) = \begin{cases} (x-1), & x \geq 1 \\ -(x-1), & x < 1 \end{cases}$$

$x=1$ point এ অবিচ্ছিন্নতার নির্ণয় কর?

বিচ্ছিন্ন ই