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Course : CSE330

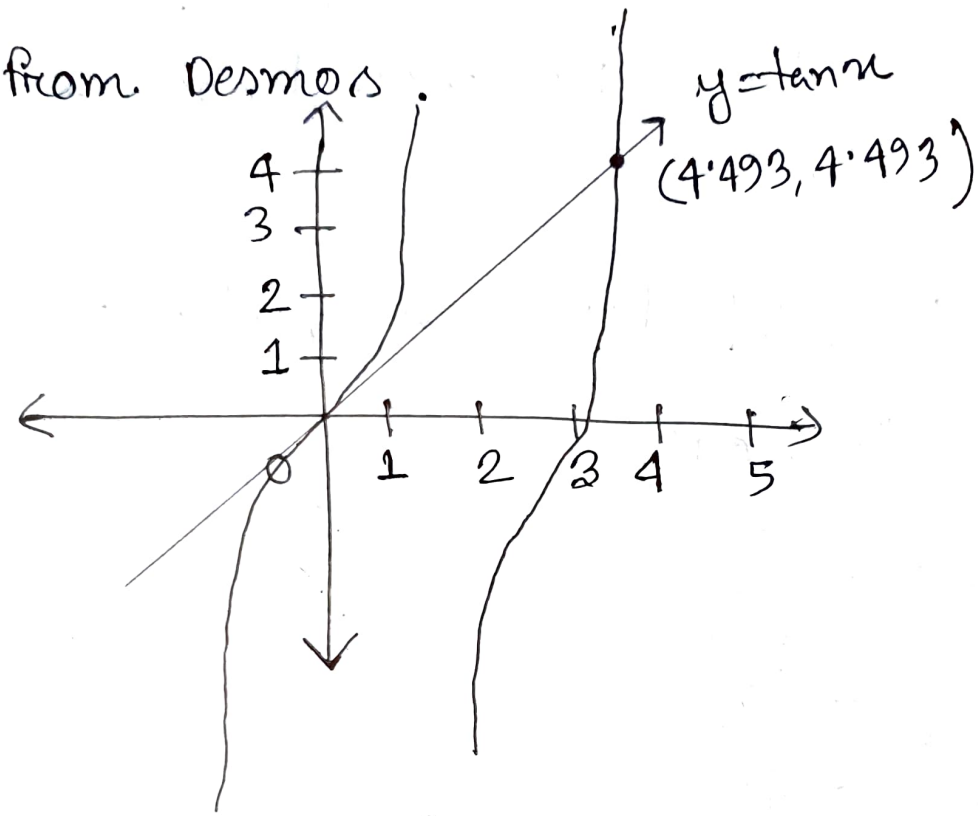
Section : 10

Assignment no: 06

Ans: to the que no: A

1

sketch from Desmos.



From the values of the graph, the first positive value of intersection point is (4·493, 4·

The positive value of x is in between [4, 5

for the graph $y = x$, $y = \tan x$.

2

Given interval is $[4,5]$. and the root for $f(x) = x - \tan x$ is in this interval.

Now, Using Bisection method:

Iteration 01:

$$c = \frac{a+b}{2}$$

$$= \frac{4+5}{2}$$

$$= 4.5$$

$$f(4.5) = -0.1373 < 0$$

New interval $[4, 4.5]$

Iteration 2:

$$c = \frac{4+4.5}{2}$$

$$= 4.25$$

$$f(4.25) = 2.2437 > 0$$

$\therefore$ $[4.25, 4.5]$

Iteration 03:

$$c = \frac{4.25 + 4.5}{2}$$

$$= 4.375$$

$$f(4.375) = 1.5244 > 0$$

New, interval = $[4.375, 4.5]$

Iteration 4:

$$c = \frac{4.375 + 4.5}{2}$$

$$= 4.4375$$

$$f(4.4375) = 0.8918 > 0$$

New interval = $[4.4375, 4.5]$

Iteration 5:

$$c = \frac{4.4375 + 4.5}{2} = 4.46875$$

$$f(4.46875) = 0.4459 > 0$$

New interval = $[4.46875, 4.5]$

Iteration 07:

$$c = \frac{4.46875 + 4.5}{2} = 4.484375$$

$$f(4.484375) = 0.1749 > 0$$

Interval = $[4.484375, 4.5]$

Iteration 07:

$$c = \frac{4.484375 + 4.5}{2}$$

$$= 4.4921875$$

$$f(4.4921875) = 0.024570$$

Interval now = $[4.4921875, 4.5]$

Iteration 08:

$$c = \frac{4.4921875 + 4.5}{2}$$

$$= 4.49609375$$

$$f(4.49609375) = -0.0549 < 0$$

$\therefore$ Interval = $[4.4921875, 4.49609375]$

Iteration: 9

$$c = 4.494140625$$

$$f(4.494140625) = -0.0148 < 0$$

$\therefore$ Interval $= [4.4921875, 4.494140625]$

Iteration 10

$$c = \frac{a+b}{2}$$

$$= 4.493164063$$

$\therefore$ Approximate first positive value $= 4.493164063$

Ans: to the que no: B

Given function,

$f(x) = x - \tan x$ and

$x \in I = [4,5]$

Here

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

$$\Rightarrow \frac{1}{x} - \frac{1}{\tan x} - x + x = 0$$

$$x = x + \frac{1}{\tan x} - \frac{1}{x}$$

Now

$$g(x) = x + \frac{1}{\tan x} - \frac{1}{x}$$

$$\therefore g(4) = 4 + \frac{1}{\tan(4)} - \frac{1}{4}$$

$$= 4.6137$$

$$g(5) = 5 + \frac{1}{\tan(5)} - \frac{1}{5}$$

$$= 4.5042$$

∴ Possible $g(x)$ is $(4.6137, 4.5042)$ and it is between $[4, 5]$

2

Now,

$$g(x) = x + \frac{1}{\tan x} - \frac{1}{x}$$

$$x \in [4, 5]$$

$$x_0 = 4.1$$

$$g(4.1) = 4.1 + \frac{1}{\tan(4.1)} - \frac{1}{4.1}$$

$$= 4.4$$

$$= 4.558578345$$

$$g(4.5585) = 4.49246869$$

$$g(4.4942) = 4.4934069614$$

$$g(4.4934) = 4.4934\,09458$$

$$g(4.4934) = 4.493409458$$

$$g(4.4934) - g(4.4934) = 0$$

∴ The fixed point $= 4.493409458$