Lab worksheet for Thursday, April 15, 2021

Practice: IVT & Limits equaling ∞

Exercise 1:

a) Show that there is a root of the equation $4x^3 - 6x^2 + 3x - 2 = 0$ between 1 and 2.

b) Can you find a better approximation for that root?

Exercise 2:

a) Show that there is a solution to the equation cos x = x on the interval (0,1).

b) If $f(x) = x^2 + 10 \sin x$, show that there is a number c such that f(x) = 1000.

Exercise 3: Suppose f is continuous on [1,5] and the only solutions of the equation f(x)=6 are x=1 and x=4. If f(2)=8, explain why f(3) > 6.

Exercise 4: Compute the following limit if it exists. If it does not exist, explain why.

a) $\lim_{x\to 3} \frac{2x}{x-3}$

b) $\lim_{x\to -3} \frac{x+2}{x+3}$

c) $\lim_{x\to 0} \frac{2-x}{x^2}$

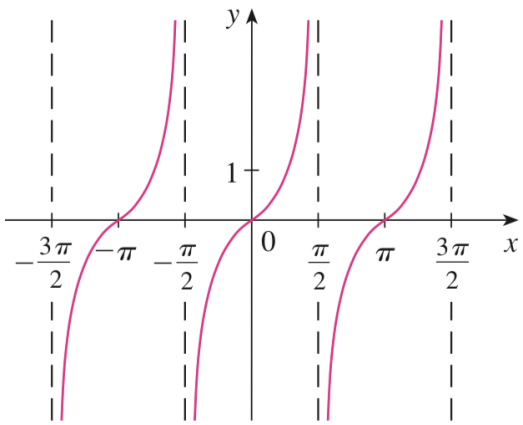
d) $\lim_{x\to 1} \frac{2-x}{(x-1)^2}$

e) $\lim_{x\to 2^-} \frac{x^2-2x}{x^2-4x+4}$

Exercise 5:

a) The graph of the function f(x) = tan x is given below. What can we say about the limits

$\lim_{x\to \frac{\pi}{2}^+} tan\, x$, $\lim_{x\to \frac{\pi}{2}^-} tan\, x$, and $\lim_{x\to \frac{\pi}{2}} tan\, x$?



b) Given that $tan\ x = \frac{sin\ x}{cos\ x}$. Justify your answer intuitively by looking at what happens to sinx and cosx when x approaches $\frac{\pi}{2}$ from the left and from the right.