Lab worksheet for Thursday, April 22, 2021

Practice: Curve-Sketching & L'Hôpital's Rule

Exercise 1: Evaluate

a) $\lim_{x \to 1} \frac{lnx}{x-1}$

b) $\lim_{x \to \infty} \frac{e^x}{x^2}$

c) $\lim_{x \to 0} \frac{\sin x}{e^x}$

d) $\lim_{x \to \infty} \frac{\ln x}{\sqrt[3]{x}}$

e) $\lim_{x \to \pi^-} \frac{\sin x}{1-\cos x}$

f) $\lim_{x \to 0} \frac{6^x-2^x}{x}$

g) $\lim_{x \to \infty} x^2 e^x$

h) $\lim_{x \to -\infty} x^2 e^x$

i) $\lim_{x \to \infty} (x - \ln x)$

j) $\lim_{x \to \infty} e^{-x} \ln x$

k) $\lim_{x \to 0} \frac{e^{4x}-1}{\cos x}$

l) $\lim_{x \to 0^+} x^x$ (Hint: $x = e^{\ln x}$)

Exercise 2: Sketch the graph of a function y=f(x) satisfying the following properties:

i. The domain of f(x) is [-5,6).

ii. The range of f(x) is $(-\infty, 5]$.

iii. f'(0)=0 and f'(x)<0 for 1<x<6.

iv. f(x) has a vertical asymptote at x=6.

v. f(x) is continuous on the interval [-5,0] but not differentiable at x=-3.

vi. f'(x)=2 for -5<x<-3.

vii. $\lim_{x \to 1} f(x)$ does not exist.