Math 17A
Kouba
Discussion Sheet 10

1.) Use any method to determine the following limits.

a.) $\lim_{x\to 3} \dfrac{x^2-3x}{x^2-9}$ b.) $\lim_{x\to\infty} \dfrac{\ln x}{x+\ln x}$ c.) $\lim_{x\to 0} \dfrac{\tan x^2}{x\sin x}$

d.) $\lim_{n\to\infty} \left(1+\dfrac{5}{n}\right)^n$ e.) $\lim_{x\to\infty} \left(\ln x\right)^{1/x}$ f.) $\lim_{x\to 0^+} \dfrac{e^x-1}{\sqrt{x}}$

g.) $\lim_{x\to\infty} \dfrac{e^x-1}{\sqrt{x}}$ h.) $\lim_{x\to 0} \dfrac{(e^x-1)^2}{x^2}$ i.) $\lim_{x\to 0^+} x^{\tan x}$

j.) $\lim_{x\to 0} \dfrac{e^{-1/x^2}}{x}$ k.) $\lim_{n\to\infty} \left(3^n+4^n\right)^{1/n}$ l.) $\lim_{x\to 0} \sin x \ln x$

2.) Use the Intermediate Value Theorem to prove that each of the following equations is solvable. Then use the Newton-Raphson Method to find each solution to three decimal places.

a.) $x^3-x+2=0$ b.) $e^x+x-3=0$

3.) a.) Prove that $\log_B x = \dfrac{\ln x}{\ln B}$. b.) Assume that $0<B<1$ and compute

i.) $\lim_{x\to\infty} \log_B x$ ii.) $\lim_{x\to 0^+} \log_B x$ iii.) $\lim_{x\to\infty} \log_{Bx} x$

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The following problem is for recreational purposes only.

4.) A camp cook wants to measure four ounces of vinegar out of a jug, but he has only a five-ounce container and a three-ounce container, both of which are unmarked. How can he do it ?

Case 1. Solve the problem assuming that there is an empty mixing bowl into which vinegar may be poured.

Case 2. Solve the problem using only the three containers which are given.