Math 30 – Workshop #23

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1. Compute the following limits.

   (a) $\lim\limits_{x\to\frac{\pi}{2}^-} \tan x \left(x^2 - \dfrac{\pi^2}{4}\right)$

   (b) $\lim\limits_{x\to 0^+} \dfrac{\sin x}{1+\cos x}$

   (c) $\lim\limits_{x\to\infty} e^{2x}\ln(1+e^{-x})$

   (d) $\lim\limits_{x\to\infty} \dfrac{\arctan\left(\frac{1}{x}\right)}{e^{\frac{1}{x}}-1}$

   (e) $\lim\limits_{x\to\infty} \left[\ln(2x^3+1) - \ln(x^3-1)\right]$

   (f) $\lim\limits_{x\to 0} \left(\dfrac{1}{x} - \dfrac{1}{1-\cos x}\right)$

   (g) $\lim\limits_{x\to\frac{\pi}{2}^-} (\tan x)^{\cos x}$

   (h) $\lim\limits_{x\to 0^+} (\cos x)^{\frac{1}{x}}$

   (i) $\lim\limits_{x\to\infty} (1-e^{-x})^{e^x}$

2. Consider the function $f(x) = \dfrac{x^2}{x^2+9}$. Find the domain, intercepts, asymptotes, intervals of increase/decrease, local max/mins, and concavity, and then graph $y = f(x)$. (Do not use a graphing calculator.)