Assignment # 3.

Due Feb. 3, 17:00

Problem 1. Find the following limits (if exist).

a. $\lim\limits_{x\to 0} \dfrac{x}{\arcsin x}$, **b.** $\lim\limits_{x\to 0} \dfrac{x}{\arccos x}$, **c.** $\lim\limits_{x\to 0^+} \dfrac{\sin x - x}{x^4}$,

d. $\lim\limits_{x\to \pi} \dfrac{\sin x}{x}$, **e.** $\lim\limits_{x\to 2\pi} \dfrac{\sin x}{x-2\pi}$, **f.** $\lim\limits_{x\to \infty} (x\,\mathrm{arccot} x)$.

Problem 2. Differentiate (simplify your answer, where possible)

a. $\arcsin(\sin x)$ on $(0, \pi/2)$, **b.** $\arcsin(\sin x)$ on $(\pi/2, \pi)$, **c.** $\arctan(\cos^2 x)$.

Problem 3. Prove that for every x one has $\arctan x + \mathrm{arccot} x = \frac{\pi}{2}$.

Problem 4. Find **a.** $\arcsin(\sin \pi)$ **b.** $\arccos(\cos(-\pi))$.

Problem 5. Find the inverse function of

a. $f(x) = \dfrac{1}{x}$ **b.** $g(x) = \sqrt{1-x^2}$ **c.** $h(x) = (x+1)^3$.