

Assignment # 6.

Due March 3, 17:00

Problem 1. Show that for every $x > 0$ one has

$$(1+x)^{1/x} < e.$$

Problem 2. Show that for every $x > 1$ one has

$$\ln(x + \sqrt{x^2 - 1}) = -\ln(x - \sqrt{x^2 - 1}).$$

Problem 3. Differentiate

a. $(\ln x)^{\cos x}$ **b.** $(\sin x)^{\ln x}$

Problem 4. Find the following limits (if exist).

a. $\lim_{x \rightarrow 0} (\cos x)^{1/\sin^2 x}$ **b.** $\lim_{x \rightarrow \infty} (x)^{1/\ln x}$ **c.** $\lim_{x \rightarrow 0^+} (x)^x.$