Assignment 12 (2/16)

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Problem 1

Problems 7.2.$(1, 8, 12, 22, 23)$.

Problem 2

$\log_a(b)$ is defined as $\frac{\ln(b)}{\ln(a)}$. Thus in particular, $\log_a b$ is not defined for $a = 1$.

1. Prove that
$$\log_{x^{p/q}} y = \frac{q}{p} \log_x y$$
for $x \neq 1$.

2. Prove that the equation
$$x^{\log_{\sqrt{x}} 2x} = 4$$
has no solution.

Problem 3

Suppose for $a, b, c > 1$, we have
$$\frac{\ln a}{b-c} = \frac{\ln b}{c-a} = \frac{\ln c}{a-b}.$$
Prove that
$$a^a.b^b.c^c = 1.$$

Problem 4

Prove that $\log_3 2$ is irrational.