Midterm 2 - 04/04 Mini Review Session - Problems

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Problem 1

Show that $f(x) = \ln(x) - x$ does **NOT** have a slant asymptote at ∞

Problem 2

Find y' if (a) $y = \cos(e^{x^2})$ and if (b) $y = x^{e^x}$

Problem 3

Find $\lim_{x \to 1} \frac{1}{\ln(x)} - \frac{1}{x-1}$

Problem 4

Find the absolute maximum and minimum of $f(x) = x^2 + x - 2|x|$ on $[-2, 2]$

Problem 5

If f is differentiable and odd, show that for every b, there is some c in $(-b, b)$ with $f'(c) = \frac{f(b)}{b}$

Problem 6

Suppose car A starts at city A, which is 6 miles east of city O and drives for 2 hours at a rate of 5 mph and car B starts at city B, which is 5 miles north of city O, and drives for 3 hours at a rate of 4 mph. At what rate is the distance between cars A and B changing at the moment when they are closest to each other?

Problem 7

A cylinder is inscribed inside a sphere of radius r. Find the largest possible volume of such a cylinder.