KIT - International Department GmbH

Pre-Semester Mathematics - Exercises Summer 2010

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1. Exercise:
Let $f(x) = \sin(x)$ and $g(x) = \frac{1}{x}$. Find the domain, the range and sketch the graphs of the following functions:

(a) $f(x)$
(b) $(f + g)(x)$
(c) $(f \cdot g)(x)$
(d) $(f \circ g)(x)$
(e) $(g \circ f)(x)$

2. Exercise:
Find the inverse functions in the following two cases:

(a) $f(x) = mx + b, \qquad m, b \in \mathbb{R}$
(b) $g(x) = \frac{1}{2}\left(e^{x} - e^{-x}\right)$

3. Exercise:
Examine whether the following function is continuous:

$$f(x) = \begin{cases} |x| & \text{for } -2 < x < 0 \\ x & \text{for } 0 \leq x < 2 \\ x^2 & \text{for } 2 \leq x < 4 \end{cases}$$