UPPSALA UNIVERSITET
Matematiska Institutionen
Validated Numerics. Fall 2015.
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Second set of Problems. First part of two. [1]

1. Describe how to perform all arithmetic operations if we represent with a computer intervals in terms of midpoint and radius.

2. Describe how to model the following Banach spaces with a computer: $L^2([0,1],\mathbb{R})_{per}$, $\mathcal{C}^r([0,1],\mathbb{R})$, $\ell^p(\mathbb{Z})$ with $1 \leq p \leq \infty$, and periodic analytic functions defined on the complex strip $[0,1] \times [-\rho, \rho]$. If any of these spaces is a Banach algebra, show how to compute enclosures of the product of any two elements.

3. Let a, b, a', b' be real intervals. Prove that $a \subseteq a'$ and $b \subseteq b'$ implies $a * b \subseteq a' * b'$.

[1] The second part will correspond to chapter 3.