Functional and Logic Programming
cpsc 370 Winter 2022
Sets — Self Check—Friday, Jan 07 2022

Review

1. Be sure you understand:

(a) Why Cartesian products are (almost) associative

(b) the formula for the cardinality of a Cartesian product.

(c) the formula for the cardinality of a powerset

(d) how the above two give the cardinality of the number of relations on $A \times B$.

2. Be sure you understand:

(a) the predicates that say when a relation f on $A \times B$ is function $f : A \to B$.

(b) the formula for the cardinality of B^A.

(c) the meaning of: **domain**, **co-domain**, **range**, **one-to-one**, **onto**.

(d) the predicates that say when a relation f on $A \times B$ is *partial* function $f : A \to B$.

(e) how you can always convert a partial function to a function by extending the codomain by one element.

3. Be sure you understand the "isomorphism" between $C^{A \times B}$ and $(C^B)^A$.

(a) In $f_3(x) = \cos(3x)$, whet is f_3? (domain? co-domain?)

(b) Ditto, $f_n(x) = \cos(nx)$.

(c) How does this relate to $g(n, x) = \cos(nx)$?

4. Sometimes it is useful to consider subsets as defined by a function on the larger set that returns `true` if and only if an element is a member of a subset. Let $\mathbf{2} = \{\top, \bot\}$ be the set containing true ($\top$) and false ($\bot$). The observation about subsets means that the power set of S, $\mathcal{P}(S)$ can be thought of as a set of functions: $\mathcal{P}(S) \equiv \mathbf{2}^S$.

Use this and Currying to explain why a relation r on $S \times T$ can be thought of as a function $\hat{r}$ from S to $\mathcal{P}(T)$.