Lecture 10 — Bags

1. Assuming that $B, C : \mathrm{bag}\, Char$ are defined as follows:

$$B == [\![k, c, a, j, k, c, a, l, b]\!]$$
$$C == [\![a]\!]$$

evaluate and give the type of the following expressions:

   (a) $B \sqsubseteq C$
   (b) $a \text{ in } B$
   (c) $a \text{ in } B \wedge a \text{ in } C$
   (d) $B \ \#\ a$
   (e) $(B \ \#\ a) + (C \ \#\ a) - 1$
   (f) $B \oplus \{c \mapsto 5\}$
   (g) $B \oplus \{c \mapsto 5\}) \setminus k \mapsto 1$

2. Given the count operator $\#$, we saw in the lecture that it is possible to define the scaling operator $\otimes$, then 'in' predicate, and the sub-bag predicate $\sqsubseteq$.

   (a) define the bag union operator, $\uplus$;
   (b) define the *items* function, which takes a sequence, and returns the bag of elements in that sequence.