Section 2 – CSE341

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Type Synonyms

What if I want to call int * int * int a date?

type date = int * int * int
Type Synonyms

type vs datatype

Datatype introduces a new type name, distinct from all existing types

datatype suit = Club | Diamond | Heart | Spade

datatype rank =

    Jack | Queen | King | Ace | Num of int

Type is just another name

type card = suit * rank
Type Synonym

Why?

For now, just for convenience.
It doesn’t let us do anything new.

Later in the course we will see another use related to modularity.
Type Generality

Write a function that appends two string lists...
Type Generality

We expected

\[
\text{string list} \times \text{string list} \rightarrow \text{string list}
\]

But the type checker says

\[
\text{\texttt{\textquoteleft a list}} \times \text{\texttt{\textquoteleft a list}} \rightarrow \text{\texttt{\textquoteleft a list}}
\]

Why is this okay?
Type Generality

The type ‘a is **more general**

More general types “can be used” as any less general type.
Type Generality

The “more general” rule

A type $t_1$ is more general than the type $t_2$ if you can take $t_1$, replace its type variables consistently, and get $t_2$
Equality Types

Write a contains function...
Equality Types

Double quotes arise from use of the ‘=’ operator

We can only use ‘=’ on types that can be compared

Generality rules work the same, except substitution must be some type which can be compared with ‘=’
Syntactic Sugar

If-then-else is just a case statement in disguise...
Syntactic Sugar

Pattern matching...