

CSE 341 Section 3

HW1 Tips
Tail Recursion
Pattern-Matching

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Agenda

- HW1 tips
 - Avoid reimplementation of functions
- Pattern-matching over expression trees
- A little tail recursion
 - What is and isn't tail recursive?
 - How can we make functions tail recursive?

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Homework 1 Check-In

Things to keep in mind:

- Easy to miss things when learning a new language!
- Test as you go & design your tests *carefully*
- Read the spec before, during, and after each problem. It's worth the extra time!
 - Check for correctness *and* redundancy/style (and review the CSE 341 Style Guide before submitting!)
- Functional programming emphasizes code reuse
 - Avoid re-implementing functionality where possible
 - Will become even more important later with higher-order function

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Key Concepts Review

- Custom datatypes
 - all of (records), one of (variants)
- Pattern matching
 - Powerful way to break apart data
- Tail recursion
 - Space efficiency of loops with recursive functions

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val-Pattern Matching

Remember our unit test?

```
(* Neat trick for creating hard-fail tests: *)
val true = ((4 div 4) = 1);
```

Just a pattern match!

"Match the left hand side against the value 'template' true, binding any variables (there aren't any!)"

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Adventures in pattern matching

- Shape example
- Function-pattern syntax if we get to it

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Pattern Matching

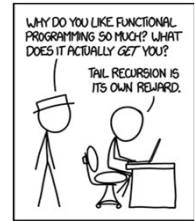
- We can pattern match over `datatypes`
- Beware “non-exhaustive matching”
 - Pattern matching can avoid “empty list” exceptions!
- Most functions pattern match over a single argument
 - SML has special syntax for this common case!
 - Use is a matter of taste
- Let’s work through some examples!

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Tail Recursion

What is it?



Briefly: if a function will immediately return after making a call, we can reuse the stack space of the current function.

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Tail Recursion

Quickcheck!

- Discuss the problems with your breakout rooms!

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Tail Recursion

- Was `length` tail recursive?
- Was `all_positive` tail recursive?
- Why tail recursion?

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