

Homework # 4

due February 23, 11:00 AM

1 Programming

A polynomial $a_n x^n + \dots + a_1 x + a_0$ can be represented as a list of reals $[a_0, a_1, \dots, a_n]$. Write functions `eval`, `pow` and `polyToString` so that we can evaluate:

```
- val p = [1.0,2.0]; (* 2x + 1 *)
val p = [1.0,2.0] : real list
- eval(p,0.1);
val it = 1.2 : real
- val p3 = pow(3,p);
val p3 = [1.0,6.0,12.0,8.0] : real list
- eval(p3,0.1);
val it = 1.728 : real
- polyToString(p3);
val it = "8.0x^3 + 12.0x^2 + 6.0x + 1.0" : string
- polyToString [0.0,0.0,~1.0,0.0,0.0];
val it = "0.0x^4 + 0.0x^3 + ~1.0x^2 + 0.0x + 0.0" : string
- polyToString [0.0];
val it = "0.0" : string
- polyToString [];
val it = "0.0" : string
```

You will need to use the functions `Real.toString` and `Int.toString` to get strings for numbers. Don't "open" either the "Real" or the "Int" structure because it will cause overloading functions to misbehave. Do not use `if` in any of your code for polynomials. Put the resulting functions in `poly.sml` in your AFS `homework4` folder.

Our solution uses four additional functions, three of them at the top-level (useful named functions), and one a helper for the `polyToString` function.

2 Overloading and Polymorphism

Do Exercises 3 and 4 of Chapter 8 (page 131).

3 Submitting Your Work

Leave `poly.sml` in your AFS folder. Turn in the book exercises on paper at the beginning of lecture.