

Tutorium Funktionale Programmierung 2019

Part 5 -Pattern Matching, Polymorphic Functions
and Type Classes

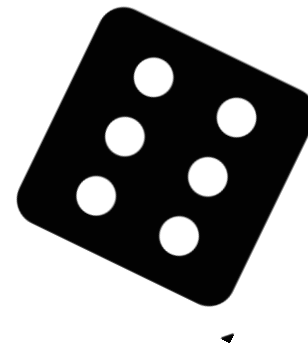
VO - Part 3 (until slide 25)

Benedikt Dornauer, 30.10.2019

Exercise 5.1. : Pattern Matching

“Mensch ärgere dich nicht!” is a funny game where you use a dice. If you play the dice, you get a number between 1 and 6. If you receive a 6 you can dice twice. So write a function that checks if you can dice again. If

- ▶ 6: return True
- ▶ 1,...,5: return False
- ▶ else: error



Only use **pattern matching**. It is not allowed to use if or guards. Test your function with 5, 6 and 7.

Exercise 5.2.: Type Classes

```
data Grade = Excellent | Average
           | Poor | NotPossible deriving Show
```

In last week's tutorial we talked about the function $g :: (Eq a) => a -> a -> Bool$. Now we want to create our own Eq class, it is called *Vergleich*, including *gleich* and *ungleich*.

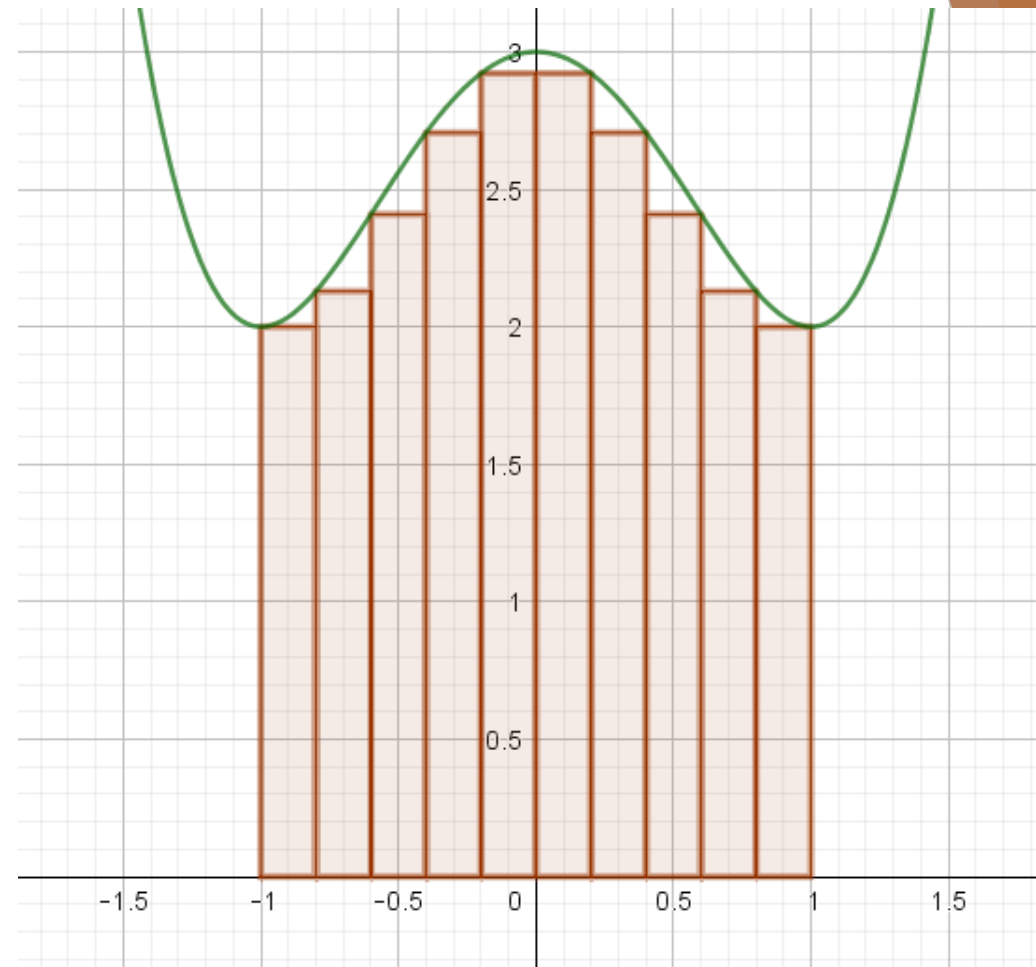
- ▶ create the class *Vergleich*.
- ▶ make the type *Grade* instances of the class *Vergleich*
- ▶ test it with the new function *g*

```
g :: (Vergleich c) => c -> c -> Bool
g x y = if (gleich x y) then True else False
```

Exercise 5.3.: Polymorphic functions and pattern matching

The function $f > 0$ is
given in Haskell.

$$x \mapsto x^4 - 2x^2 + 3$$



```
f :: (Fractional a) => a -> a
f x = x^4 - 2*x^2 + 3
```

Exercise 5.3. Continued: Polymorphic functions and pattern matching

You want to approximate the integral using the Riemann sum from a to b ($a \leq b$) for the function f .

- ▶ a start point
- ▶ b end point ($a \leq b$)
- ▶ n is the number of rectangles to approximate the area.

$$A = \sum_{i=0}^n f(a + n * (b - a)) * \frac{b - a}{n}$$

The “area A ” of the function f should be calculated by the Riemann sum. Use **pattern matching** and **polymorphic function**.

Exercise 5.3. Continued : Polymorphic functions and pattern matching

- ▶ Approximate the area from -1 to 1 for the function f with
 - ▶ $n = 1$
 - ▶ $n = 10$
 - ▶ $n = 100$
 - ▶ $n = 1000$

Questions? Need help? Feedback? etc.

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