

Truth tables and logic translation with Haskell

```
data Bool = False | True
```

```
and     $\wedge$     &&
```

```
or      $\vee$      ||
```

```
implies  $\rightarrow$     <=
```

```
not     $\neg$      not
```

Lists

```
[1, 2, 3, 4, 5] :: [Int]
```

```
[True, True, False, True] :: [Bool]
```

```
[1..5]      [1, 3..9]  $\rightarrow$  [1, 3, 5, 7, 9]
```

```
[1, 3..10]  $\rightarrow$ 
```

```
[5, 4..1] = [5, 4, 3, 2, 1]
```

```
↪
```

```
-1
```

List comprehension

```
[exp | generators and filters]
```

```
x ← list, boolean exp
```

```
[(x, y) | x ← [1..4], y ← [1..3]]
```

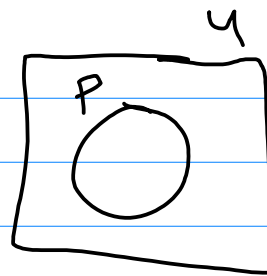
```
{(x, y) | x ∈ {1, 2, 3, 4}, y ∈ {1, 2, 3}}
```

$$P \rightarrow Q = \neg P \vee Q$$

$u = \text{universe of discourse}$

$$\forall x P(x)$$

$$\exists x P(x)$$



$$u = [1..20]$$

$$\forall x x < 25$$

$$[x < 25 \mid x \leftarrow u] \quad p :: \text{Int} \rightarrow \text{Bool}$$

$$\forall x P(x) \quad \text{as} \quad \text{and} \quad [p \ x \mid x \leftarrow u]$$

$$\exists x P(x) \quad \text{as} \quad \text{or} \quad [p \ x \mid x \leftarrow u]$$

$$\text{all} :: (a \rightarrow \text{Bool}) \rightarrow [a] \rightarrow \text{Bool}$$

any ::

$$\text{all} (< 25) \ u$$

$$\text{all} \ p \ u$$

$$\forall x P(x) \rightarrow Q(x)$$

$$\forall x Q(x)$$

$$\exists x P(x) \wedge Q(x)$$

$$\text{and} \ [p \ x \leq q \ x \mid x \leftarrow u]$$

$$\text{or} \ [p \ x \ \&\& \ q \ x \mid x \leftarrow u]$$

$$\text{and} \ [q \ x \mid x \leftarrow u, \ p \ x]$$

filter

$$\text{or} \ [q \ x \mid x \leftarrow u, \ p \ x]$$

\square distributes over \circ if

$$x \square (y \circ z) = (x \square y) \circ (x \square z)$$
