

CS 135 — Racket Quick Notes

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Prefix Notation

```
(* (/ 6 2) (+ 1 2))
```

Racket uses **prefix notation**. A substitution step evaluates the leftmost / innermost sub-expression (i.e., the one that closes first).

Arithmetic Operators

+ - * /

These operators can take **two or more arguments** and associate left-to-right.

Negation (unary -):

```
(- 144) ; = -144
```

```
(- -21) ; = 21
```

This is an **error** (needs ≥ 2 args for +): `(+ 72)`

Practice Questions

```
(+ 3 (* 5 2))
```

```
(/ (- 10 4) 2)
```

```
(* 7 (+ 3 1))
```

```
(- (- (- 10 100)) (- -10 -15) (- -20))
```

Number Types (CS 135)

- **Nat** — natural numbers (includes 0)
- **Int** — integers (includes Nat)
- **Rat** — rationals (includes Int)

Useful Functions

```
(quotient 43 7) ; Int → takes Ints only
```

```
(remainder 43 7) ; Nat → takes Ints only
```

```
(max 1 2 3 4) ; = 4
```

```
(min 1 2 3 4) ; = 1
```

```
(max 9) ; = 9
```

```
(min 9) ; = 9
```

```
(sqr 12) ; = 144
```

```
(expt 3 4) ; = 81 ; 3^4
```

Constant Definitions

Constants cannot be redefined after their initial definition.

```
(define x 7)
(define y (+ x 4)) ; x = 7, y = 11
```

Example:

racket

```
(define cost-per-pizza 12)
(define cost-per-drink 3)
(define pizzas-needed 8)
(define drinks-needed 15)

(+ (* cost-per-pizza pizzas-needed)
  (* cost-per-drink drinks-needed))
```

Boolean Expressions

- Relational operators: < > <= >= = → return **Bool** (#true or #false).
- Logical operators: and, or, not.

Short-circuit evaluation

- and → returns #false immediately if any argument is false.
- or → returns #true immediately if any argument is true.

(DML/design recipe ideas can help keep expressions simple and readable.)

Example:

```
(+ (= 6 7) 8) ; false (0) + 8 = 8
```