

# Clojure Cheat Sheet (Clojure 1.8 - 1.11, sheet v55)

## Documentation

clojure.repl/ doc find-doc apropos dir source pst javadoc (foo.bar/ is namespace for later syms)

## Primitives

### Numbers

Literals Long: 7, hex 0xf, oct 017, base 2 2r1011, base 36 36rCRAZY BigInt: 7N Ratio: -22/7 Double: 2.78 -1.2e-5 BigDecimal: 4.2M  
Arithmetic + - \* / quot rem mod inc dec max min + ' - ' \* ' inc' dec' (1.11) abs (clojure.math/) floor-div floor-mod ceil floor rint round pow sqrt cbrt E exp expm1 log log10 loglp PI sin cos tan asin acos atan2  
Compare == < > <= >= compare  
Bitwise bit-and bit-or bit-xor bit-not bit-flip bit-set bit-shift-right bit-shift-left bit-and-not bit-clear bit-test unsigned-bit-shift-right (see BigInteger for integers larger than Long)  
Cast byte short int long float double bigdec bigint num rationalize biginteger  
Test zero? pos? neg? even? odd? number? rational? integer? ratio? decimal? float? (1.9) double? int? nat-int? neg-int? pos-int? (1.11) NaN? infinite?  
Random rand rand-int (1.11) (clojure.math/) random  
BigDecimal with-precision  
Unchecked \*unchecked-math\* unchecked-add unchecked-dec unchecked-inc unchecked-multiply unchecked-negate unchecked-subtract

### Strings

Create str format "a string" "escapes \b\f\n\t\r\" octal \377 hex \ucafe" See also section IO/to string  
Use count get subs compare (clojure.string/) join escape split split-lines replace replace-first reverse index-of last-index-of (1.11) (clojure.core/) parse-boolean parse-double parse-long parse-uuid  
Regex #"pattern" re-find re-seq re-matches re-pattern re-matcher re-groups (clojure.string/) replace replace-first re-quote-replacement Note: \ in #" is not escape char. (re-pattern "\s\*\d+") can be written #"\s\*\d+"  
Letters (clojure.string/) capitalize lower-case upper-case  
Trim (clojure.string/) trim trim-newline triml trimr  
Test string? (clojure.string/) blank? starts-with? ends-with? includes?

### Other

Characters char char? char-name-string char-escape-string literals: \a \newline (more at link)  
Keywords keyword keyword? find-keyword literals: :kw :my.name.space/kw ::in-cur-namespace ::namespace-alias/kw  
Symbols symbol symbol? gensym literals: my-sym my.ns/foo  
Misc literals: true false nil

## Collections

### Collections

Generic ops count empty not-empty into conj (clojure.walk/) walk prewalk prewalk-demo prewalk-replace postwalk postwalk-demo postwalk-replace (1.9) bounded-count  
Content tests distinct? empty? every? not-every? some not-any?  
Capabilities sequential? associative? sorted? counted? reversible?  
Type tests coll? list? vector? set? map? seq? record? map-entry?

### Lists (conj, pop, & peek at beginning)

Create () list list\*  
Examine first nth peek .indexOf .lastIndexOf  
'Change' cons conj rest pop

### Vectors (conj, pop, & peek at end)

Create [] vector vec vector-of mapv filterv  
Examine (my-vec idx) -> (nth my-vec idx) get peek .indexOf .lastIndexOf  
'Change' assoc assoc-in pop subvec replace conj rseq update update-in  
Ops reduce-kv

### Sets

Create unsorted #{ } set hash-set  
Create sorted sorted-set sorted-set-by (clojure.data.avl/) sorted-set sorted-set-by (flatland.ordered.set/) ordered-set (clojure.data.int-map/) int-set dense-int-set  
Examine (my-set item) -> (get my-set item) contains?  
'Change' conj disj  
Set ops (clojure.set/) union difference intersection select See also section Relations  
Test (clojure.set/) subset? superset?  
Sorted sets rseq subseq rsubseq

### Maps

Create unsorted {} hash-map array-map zipmap bean frequencies group-by (clojure.set/) index  
Create sorted sorted-map sorted-map-by (clojure.data.avl/) sorted-map sorted-map-by (flatland.ordered.map/) ordered-map (clojure.data.priority-map/) priority-map (flatland.useful.map/) ordering-map (clojure.data.int-map/) int-map  
Examine (my-map k) -> (get my-map k) also (:key my-map) -> (get my-map :key) get-in contains? find keys vals  
'Change' assoc assoc-in dissoc merge merge-with select-keys update update-in (clojure.set/) rename-keys map-invert (1.11) (clojure.core/) update-keys update-vals GitHub: Medley  
Ops reduce-kv  
Entry key val  
Sorted maps rseq subseq rsubseq

### Queues (conj at end, peek & pop from beginning)

Create clojure.lang.PersistentQueue/EMPTY (no literal syntax or constructor fn)  
Examine peek  
'Change' conj pop

## Relations (set of maps, each with same keys, aka rels)

Rel algebra (clojure.set/) join select project union difference intersection index rename

## Transients (clojure.org/reference/transients)

Create transient persistent!  
Change conj! pop! assoc! dissoc! disj! Note: always use return value for later changes, never original!

## Misc

Compare = identical? not= not compare clojure.data/diff  
Test true? false? instance? nil? some?

## Sequences

### Creating a Lazy Seq

From collection seq vals keys rseq subseq rsubseq sequence  
From producer fn lazy-seq repeatedly iterate (1.11) iteration  
From constant repeat range  
From other file-seq line-seq resultset-seq re-seq tree-seq xml-seq  
iterator-seq enumeration-seq  
From seq keep keep-indexed

### Seq in, Seq out

Get shorter distinct filter remove take-nth for dedupe random-sample  
Get longer cons conj concat lazy-cat mapcat cycle interleave interpose  
Tail-items rest nthrest next fnext nnext drop drop-while take-last for  
Head-items take take-while butlast drop-last for  
'Change' conj concat distinct flatten group-by partition partition-all partition-by split-at split-with filter remove replace shuffle  
Reverse sort sort-by compare  
Rearrange  
Process items map pmap map-indexed mapcat for replace seque

### Using a Seq

Extract item first second last rest next ffirst nfirst fnext nnext nth nthnext rand-nth when-first max-key min-key  
Construct coll zipmap into reduce reductions set vec into-array to-array-2d mapv filterv  
Pass to fn apply  
Search some filter  
Force evaluation doseq dorun doall run!  
Check for forced realized?

## Transducers (clojure.org/reference/transducers)

Off the shelf map mapcat filter remove take take-while take-nth drop drop-while replace partition-by partition-all keep keep-indexed map-indexed distinct interpose cat dedupe random-sample (1.9) halt-when  
Create your own completing ensure-reduced unreduced See also section Concurrency/Volatiles  
Use into sequence transduce education  
Early termination reduced reduced? deref

## Spec (rationale, guide)

Operations valid? conform uniform explain explain-data explain-str explain-out form describe assert check-asserts check-asserts?  
Generator ops gen exercise exercise-fn  
Defn. & registry def fdef registry get-spec spec? spec with-gen  
Logical and or  
Collection coll-of map-of every every-kv keys merge  
Regex cat alt \* + ? & keys\*  
Range int-in inst-in double-in int-in-range? inst-in-range?  
Other nilable multi-spec fspec conformer  
Custom explain explain-printer \*explain-out\*

### Predicates with test.check generators

Numbers number? rational? integer? ratio? decimal? float? zero? (1.9) double? int? nat-int? neg-int? pos-int?  
Symbols, keywords keyword? symbol? (1.9) ident? qualified-ident? qualified-keyword? qualified-symbol? simple-ident? simple-keyword? simple-symbol?  
Other string? true? false? nil? some? (1.9) boolean? bytes? inst? scalars uri? uuid?  
Collections list? map? set? vector? associative? coll? sequential? seq? empty? (1.9) indexed? seqable?  
Other (1.9) any?

## IO

to/from spit slurp (to writer/from reader, Socket, string with file name, URI, etc.)  
...  
to \*out\* pr prn print printf println newline (clojure.pprint/) print-table (clojure.pprint/) pprint cl-format also: (binding [\*out\* writer] ...)  
to string format with-out-str pr-str prn-str print-str println-str  
from \*in\* read-line (clojure.edn/) read (clojure.tools.reader.edn/) read from reader line-seq (clojure.edn/) read (clojure.tools.reader.edn/) read also: (binding [\*in\* reader] ...) java.io.Reader  
from string with-in-str (clojure.edn/) read-string (clojure.tools.reader.edn/) read-string  
Open with-open (clojure.java.io/) text: reader writer binary: input-stream output-stream  
Binary (.write ostream byte-arr) (.read istream byte-arr) java.io.OutputStream java.io.InputStream GitHub: gloss byte-spec  
Misc flush (.close s) file-seq \*in\* \*out\* \*err\* (clojure.java.io/) file copy delete-file resource as-file as-url as-relative-path GitHub: fs \*data-readers\* default-data-readers \*default-data-reader-fn\*  
Data readers tap (1.10) tap> add-tap remove-tap

## Functions

Create fn defn defn- definline identity constantly memfn comp complement partial juxt memoize fnil every-pred some-fn  
Call apply -> ->> trampolines as-> cond-> cond->> some-> some->>  
Test fn? ifn?

## Abstractions (Clojure type selection flowchart)

### Protocols (clojure.org/reference/protocols)

Define	(defprotocol Slice (slice [at]))
Extend	(extend-type String Slice (slice [at] ...))
Extend null	(extend-type nil Slice (slice [_] nil))
Reify	(reify Slice (slice [at] ...))
Test	satisfies? extends?
Other	extend extend-protocol extenders

### Records (clojure.org/reference/datypes)

Define	(defrecord Pair [h t])
Access	(.h (Pair. 1 2)) → 1
Create	Pair. →Pair map→Pair
Test	record?

### Types (clojure.org/reference/datypes)

Define	(deftype Pair [h t])
Access	(.h (Pair. 1 2)) → 1
Create	Pair. →Pair
With methods	Object (toString [this] (str "< h >," t ">"))

### Multimethods (clojure.org/reference/multimethods)

Define	(defmulti my-mm dispatch-fn)
Method define	(defmethod my-mm :dispatch-value [args] ...)
Dispatch	get-method methods
Remove	remove-method remove-all-methods
Prefer	prefer-method prefers
Relation	derive underive isa? parents ancestors descendants make-hierarchy

## Datify (article)

Datify (clojure.datify/) datify nav

## Macros

Create	defmacro definline
Debug	macroexpand-1 macroexpand (clojure.walk/) macroexpand-all
Branch	and or when when-not when-let when-first if-not if-let cond condp case when-some if-some
Loop	for doseq dotimes while
Arrange	.. doto → →> as→ cond→ cond->> some→ some->>
Scope	binding locking time with-in-str with-local-vars with-open with-out-str with-precision with-redefs with-redefs-fn
Lazy	lazy-cat lazy-seq delay
Doc.	assert comment doc

## Special Characters (clojure.org/reference/reader, guide)

,	Comma reads as white space. Often used between map key/value pairs for readability.
'	quote: 'form → ( quote form)
/	Namespace separator (see Primitives/Other section)
\	Character literal (see Primitives/Other section)
:	Keyword (see Primitives/Other section)
;	Single line comment
^	Metadata (see Metadata section)
*foo*	'earmuffs' - convention to indicate dynamic vars, compiler warns if not dynamic
@	Deref: @form → ( deref form)
'	Syntax-quote
foo#	'auto-gensym', consistently replaced with same auto-generated symbol everywhere inside same '( ... )
-	Unquote
-@	Unquote-splicing
->	'thread first' macro →
->>	'thread last' macro →>
>!! <!! >! <!	core.async channel macros >!! <!! >! <!
(	List literal (see Collections/Lists section)
[	Vector literal (see Collections/Vectors section)
{	Map literal (see Collections/Maps section)
#'	Var-quote #'x → ( var x)
##	##"p" reads as regex pattern p (see Strings/Regex section)
{#	Set literal (see Collections/Sets section)
#(	Anonymous function literal: #( ... ) → (fn [args] (...))
%	Anonymous function argument: %N is value of anonymous function arg N. % short for %1. %& for rest args.
##?	Reader conditional: ##?(:clj x :cljs y) reads as x on JVM, y in ClojureScript, nothing elsewhere. Other keys: :cljr :default
##?@	Splicing reader conditional: [1 ##?@(:clj [x y] :cljs [w z]) 3] reads as [1 x y 3] on JVM, [1 w z 3] in ClojureScript, [1 3] elsewhere.
#foo	tagged literal e.g. #inst #uuid
#:	map namespace syntax e.g. #:foo{:a 1 :b 2} is equal to {:foo/a 1 :foo/b 2}
##	(1.9) symbolic values: ##Inf ##-Inf ##NaN
\$	JavaContainerClass\$InnerClass
foo?	conventional ending for a predicate, e.g.: zero? vector? instance? (unenforced)
foo!	conventional ending for an unsafe operation, e.g.: set! swap! alter-meta! (unenforced)
-	conventional name for an unused value (unenforced)
#_	ignore next form

## Metadata (clojure.org/reference/reader, special\_forms)

General	~{:key1 val1 :key2 val2 ...}
Abbrevs	~Type → ~{:tag Type}, ~:key → ~{:key true}
Common	~:dynamic ~:private ~:doc ~:const
Examples	(defn ~:private "String my-fn ...") (def ~:dynamic *dyn-var* val)
On Vars	meta with-meta vary-meta alter-meta! reset-meta! doc find-doc test

## Special Forms (clojure.org/reference/special\_forms)

def	def do let letfn quote var fn loop recur set! throw try monitor-enter monitor-exit
Binding Forms /	(examples) let fn defn defmacro loop for doseq if-let when-let
Destructuring	if-some when-some

## Vars and global environment (clojure.org/reference/vars)

Def variants	def defn defn- definline defmacro defmethod defmulti defonce defrecord
Interned vars	declare intern binding find-var var
Var objects	with-local-vars var-get var-set alter-var-root var? bound? thread-bound?
Var validators	set-validator! get-validator

## Namespace

Current	*ns*
Create/Switch	(tutorial) ns in-ns create-ns
Add	alias def import intern refer
Find	all-ns find-ns
Examine	ns-name ns-aliases ns-map ns-interns ns-publics ns-refers ns-imports
From symbol	resolve ns-resolve namespace the-ns (1.10) requiring-resolve
Remove	ns-unalias ns-unmap remove-ns

## Loading

Load libs	(tutorial) require use import refer
List loaded	loaded-libs
Load misc	load load-file load-reader load-string

## Concurrency

Atoms	atom swap! reset! compare-and-set! (1.9) swap-vals! reset-vals!
Futures	future future-call future-done? future-cancel future-cancelled? future?
Threads	bound-fn bound-fn* get-thread-bindings push-thread-bindings pop-thread-bindings thread-bound?
Volatiles	volatile! vreset! vswap! volatile?
Misc	locking pcalls pvalues pmap seqe promise deliver

## Refs and Transactions (clojure.org/reference/refs)

Create	ref
Examine	deref @ (@form → (deref form))
Transaction	sync dosync io!
In transaction	ensure ref-set alter commute
Validators	set-validator! get-validator
History	ref-history-count ref-min-history ref-max-history

## Agents and Asynchronous Actions (clojure.org/reference/agents)

Create	agent
Examine	agent-error
Change state	send send-off restart-agent send-via set-agent-send-executor! set-agent-send-off-executor!
Block waiting	await await-for
Ref validators	set-validator! get-validator
Watchers	add-watch remove-watch
Thread handling	shutdown-agents
Error	error-handler set-error-handler! error-mode set-error-mode!
Misc	*agent* release-pending-sends

## Java Interoperation (clojure.org/reference/java\_interop)

General	.. doto Classname/ Classname. new bean comparator enumeration-seq import iterator-seq memfn set! class class? bases supers type gen-class gen-interface definterface
Cast	boolean byte short char int long float double bigdec bigint num cast biginteger
Exceptions	throw try catch finally pst ex-info ex-data Throwable->map (1.9) StackTraceElement->vec (1.10) ex-cause ex-message (clojure.main/) ex-triage ex-str err->msg report-error

## Arrays

Create	make-array object-array boolean-array byte-array short-array char-array int-array long-array float-array double-array aclone to-array to-array-2d into-array
Use	aget aset aset-boolean aset-byte aset-short aset-char aset-int aset-long aset-float aset-double alength amap areduce
Cast	booleans bytes shorts chars ints longs floats doubles

## Proxy (Clojure type selection flowchart)

Create	proxy get-proxy-class construct-proxy init-proxy
Misc	proxy-mappings proxy-super update-proxy

## Zipper (clojure.zip/)

Create	zipper seq-zip vector-zip xml-zip
Get loc	up down left right leftmost rightmost
Get seq	lefts rights path children
'Change'	make-node replace edit insert-child insert-left insert-right append-child remove
Move	next prev
Misc	root node branch? end?

## Other

XML	clojure.xml/parse xml-seq
REPL	*1 *2 *3 *g *print-dup* *print-length* *print-level* *print-meta* *print-readably*
Code	*compile-files* *compile-path* *file* *warn-on-reflection* compile loaded-libs test
Misc	eval force hash name *clojure-version* clojure-version *command-line-args* (1.11) random-uuid
Browser / Shell	(clojure.java.browse/) browse-url (clojure.java.shell/) sh with-sh-dir with-sh-env