Not on Midterm 1

61A Lecture 10

Monday, September 17

Sequence Iteration

Sequence Iteration

```
def count(s, value):
    total = 0
    for elem in s:
        if elem == value:
            total = total + 1
    return total
```

Name bound in the first frame of the current environment

For Statement Execution Procedure

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```
for <name> in <expression>:
    <suite>
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1. Evaluate the header <expression>, which must yield an iterable value.

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   A. Bind <name> to that element in the first frame of the current environment.

   B. Execute the <suite>.

Sequence Unpacking in For Statements

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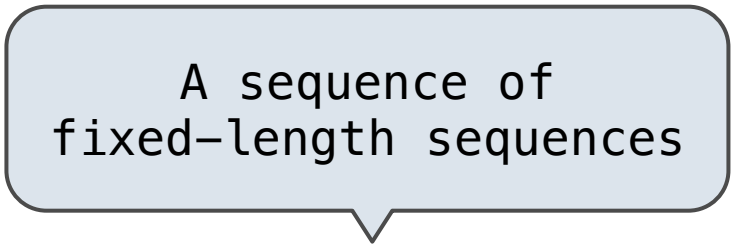
```
>>> pairs = ((1, 2), (2, 2), (2, 3), (4, 4))
>>> same_count = 0
```

Sequence Unpacking in For Statements

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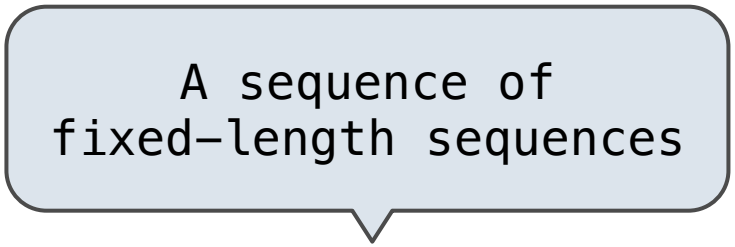
Sequence Unpacking in For Statements

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>>> for x, y in pairs:
        if x == y:
            same_count = same_count + 1

>>> same_count
2
```

Sequence Unpacking in For Statements

A sequence of fixed-length sequences

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A name for each element in a fixed-length sequence

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Sequence Unpacking in For Statements

A sequence of fixed-length sequences

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>>> pairs = ((1, 2), (2, 2), (2, 3), (4, 4))
>>> same_count = 0
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A name for each element in a fixed-length sequence

Each name is bound to a value, as in multiple assignment

```
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The Range Type

A range is a sequence of consecutive integers.*

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..., -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, ...

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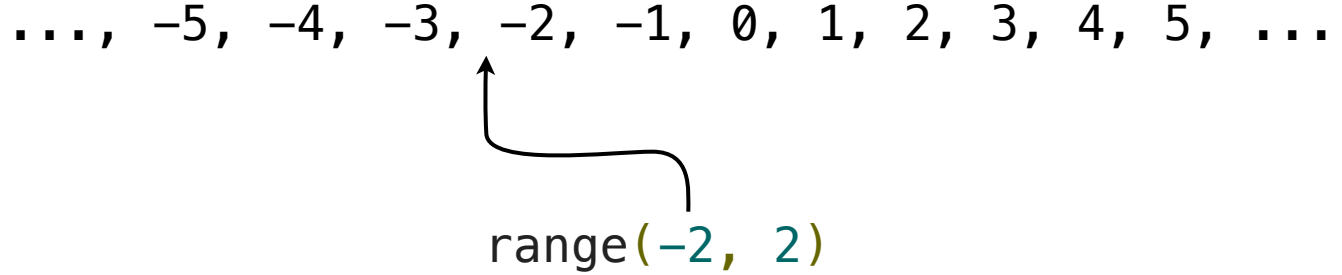

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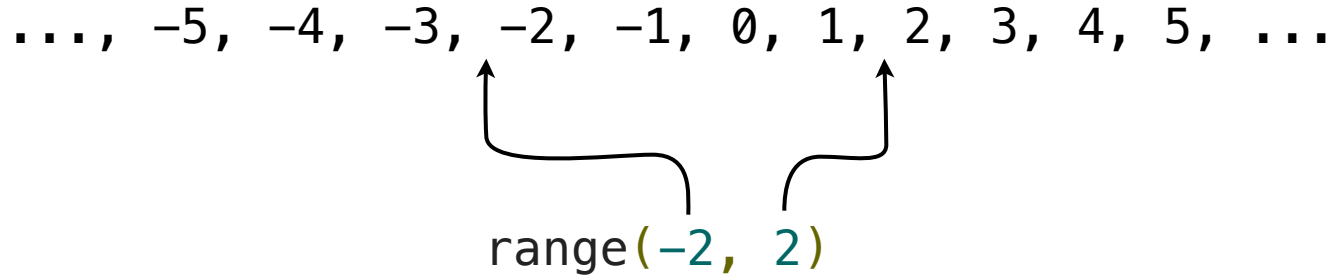

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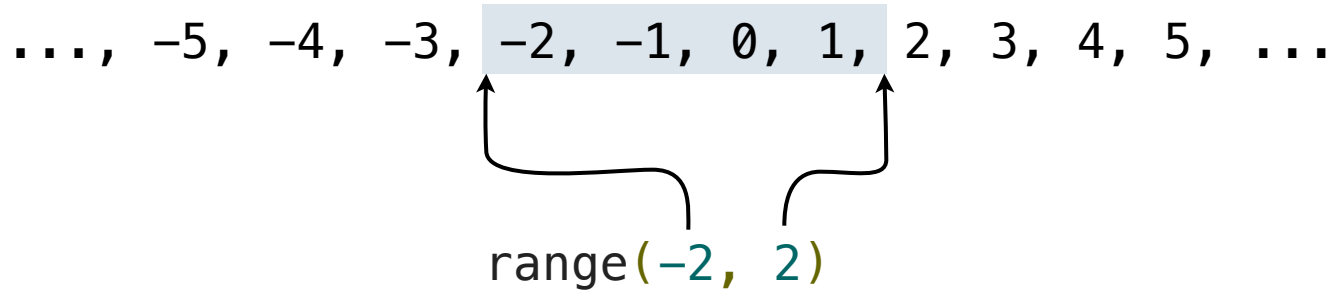

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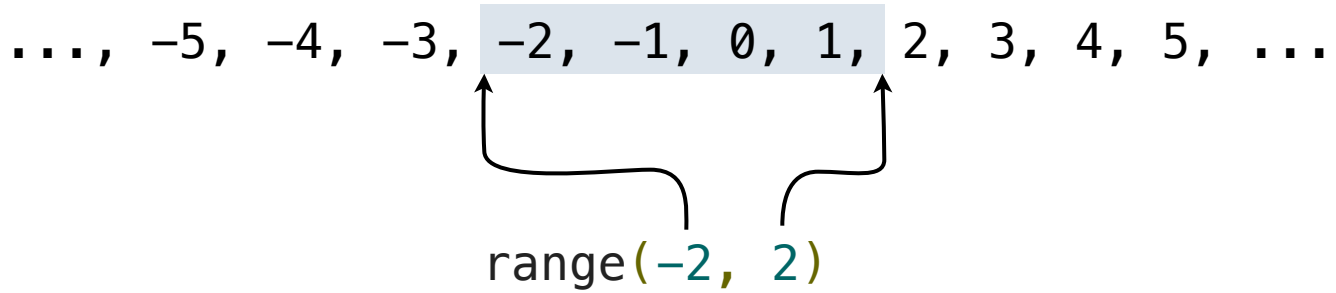

Length: ending value - starting value

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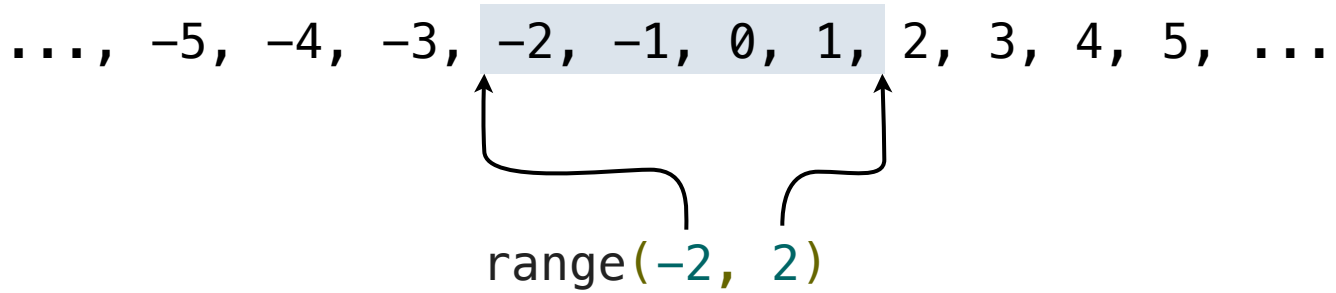

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Element selection: starting value + index

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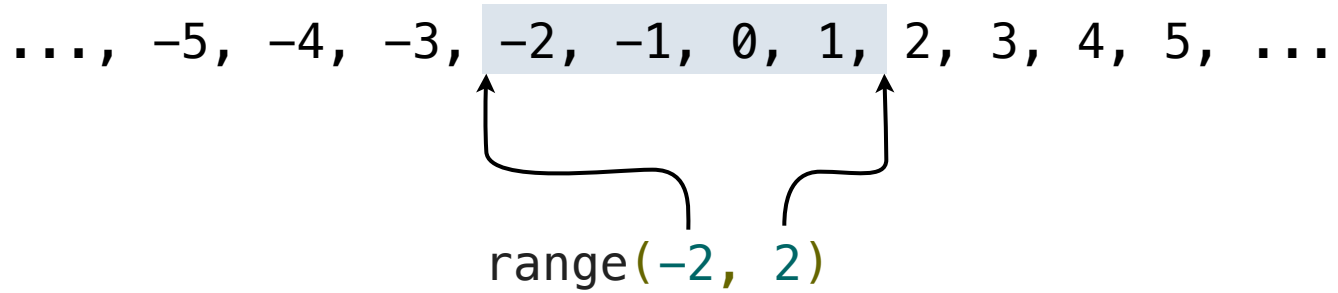

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>>> tuple(range(-2, 2))
(-2, -1, 0, 1)

>>> tuple(range(4))
(0, 1, 2, 3)
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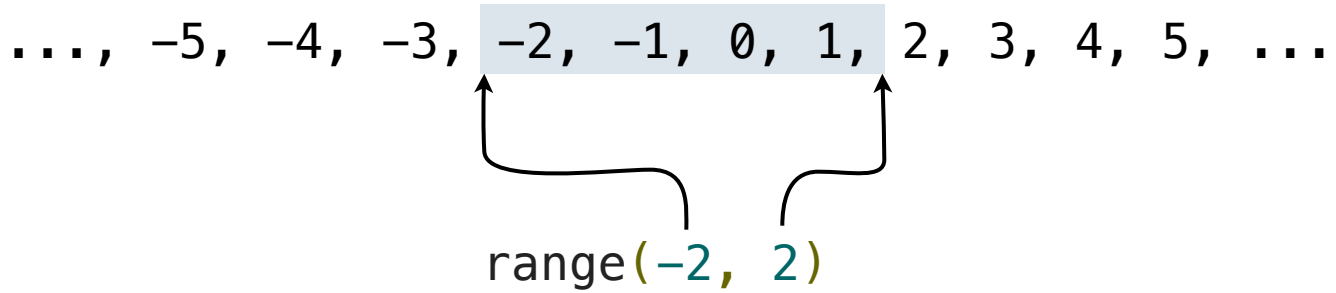

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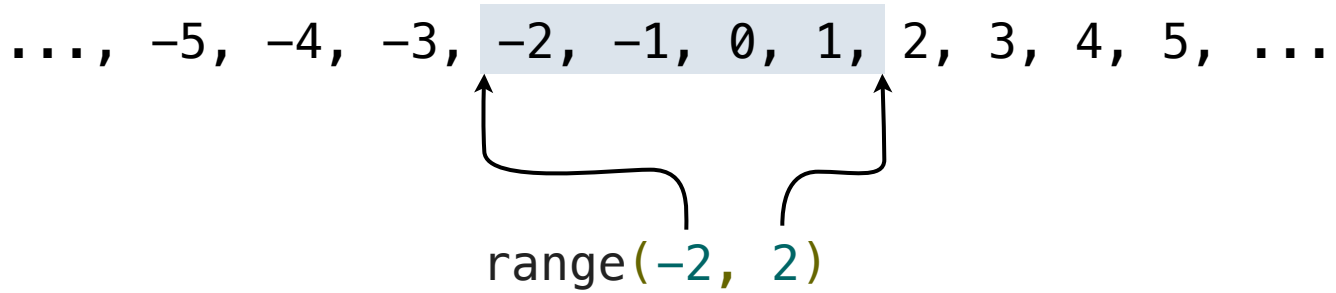

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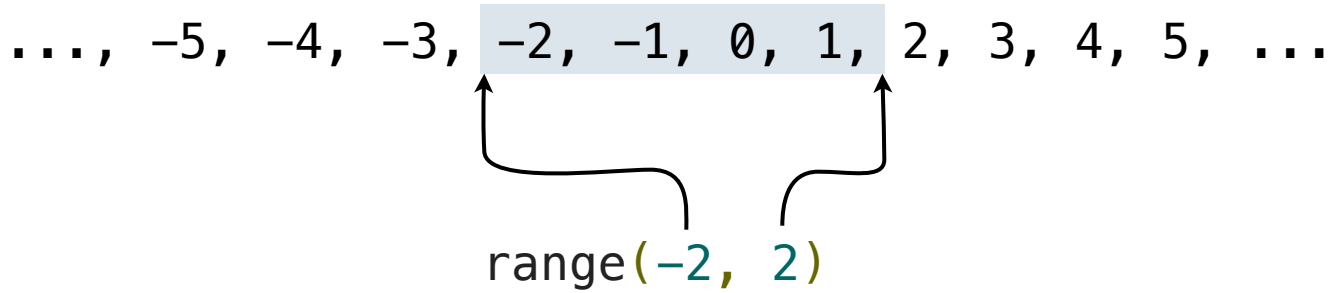

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(Demo)

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Membership & Slicing

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>>> 1828 not in digits
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```

Slicing.

```
>>> digits[0:2]
(1, 8)
>>> digits[1:]
(8, 2, 8)
```

Strings are an Abstraction

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Representing data:

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'200'      '1.2e-5'      'False'      '(1, 2)'
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Representing programs:

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'curry = lambda f: lambda x: lambda y: f(x, y)'
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Demo

String Literals Have Three Forms

```
>>> 'I am string!'
'I am string!'

>>> "I've got an apostrophe"
"I've got an apostrophe"

>>> '您好'
'您好'
```

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"Line feed" character represents a new line

Strings are Sequences

Strings are Sequences

Length. A sequence has a finite length.

Element selection. A sequence has an element corresponding to any non-negative integer index less than its length, starting at 0 for the first element.

Strings are Sequences

```
>>> city = 'Berkeley'
>>> len(city)
8
>>> city[3]
'k'
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String arithmetic is similar to tuple arithmetic

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Representing Strings: the ASCII Standard

Bonus Material

American Standard Code for Information Interchange

ASCII Code Chart

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	SOH	STX	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
1	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
2		!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
6	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	DEL

Representing Strings: the ASCII Standard

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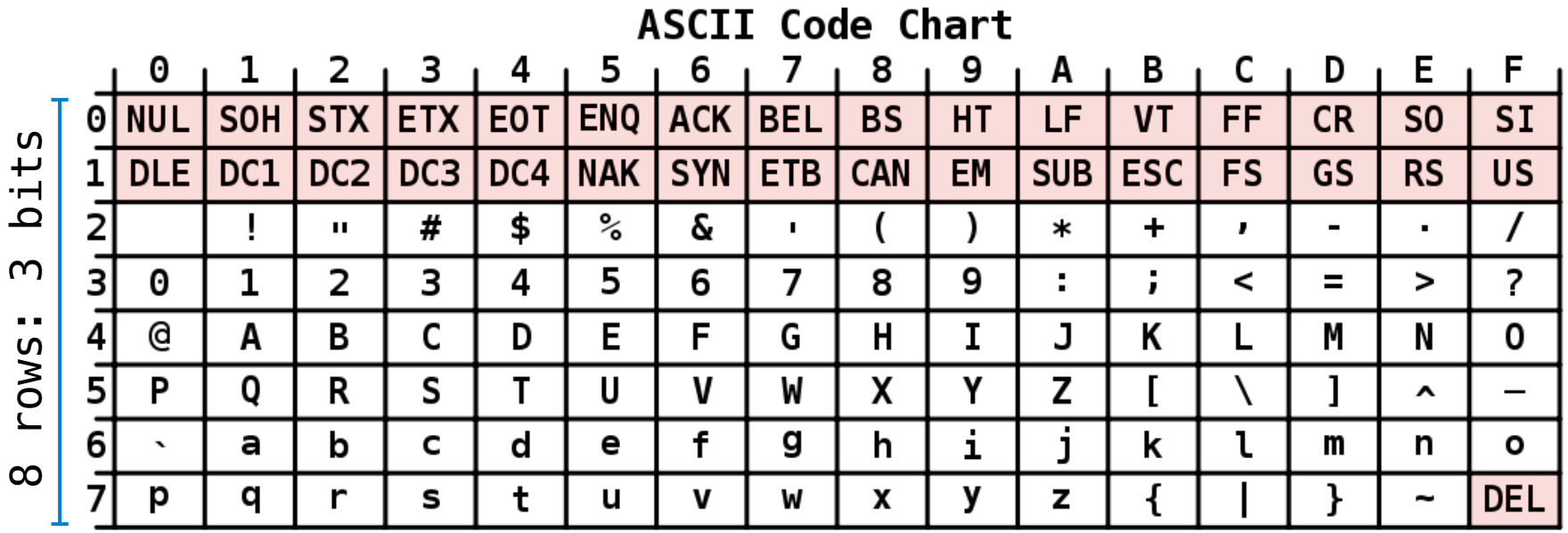

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	SOH	STX	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
1	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
2		!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
6	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
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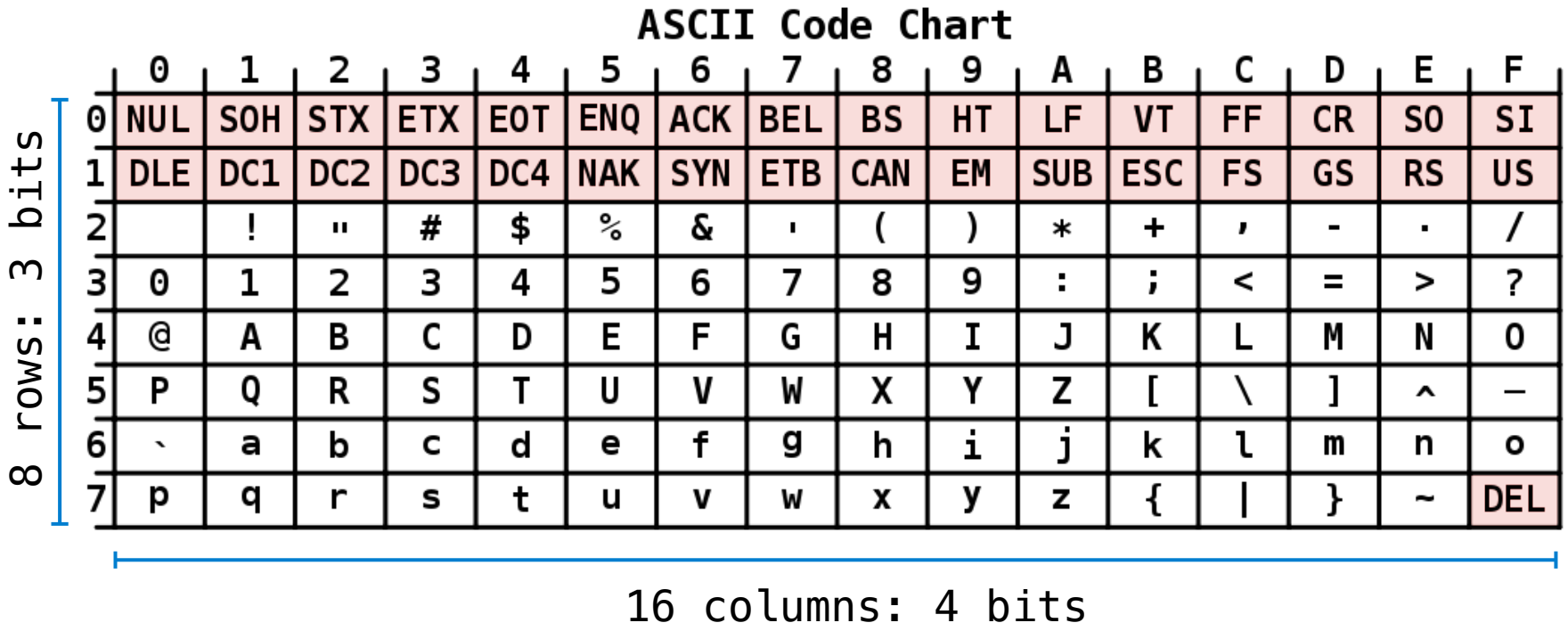

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	SOH	STX	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
1	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
2		!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
6	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	DEL

Representing Strings: the ASCII Standard

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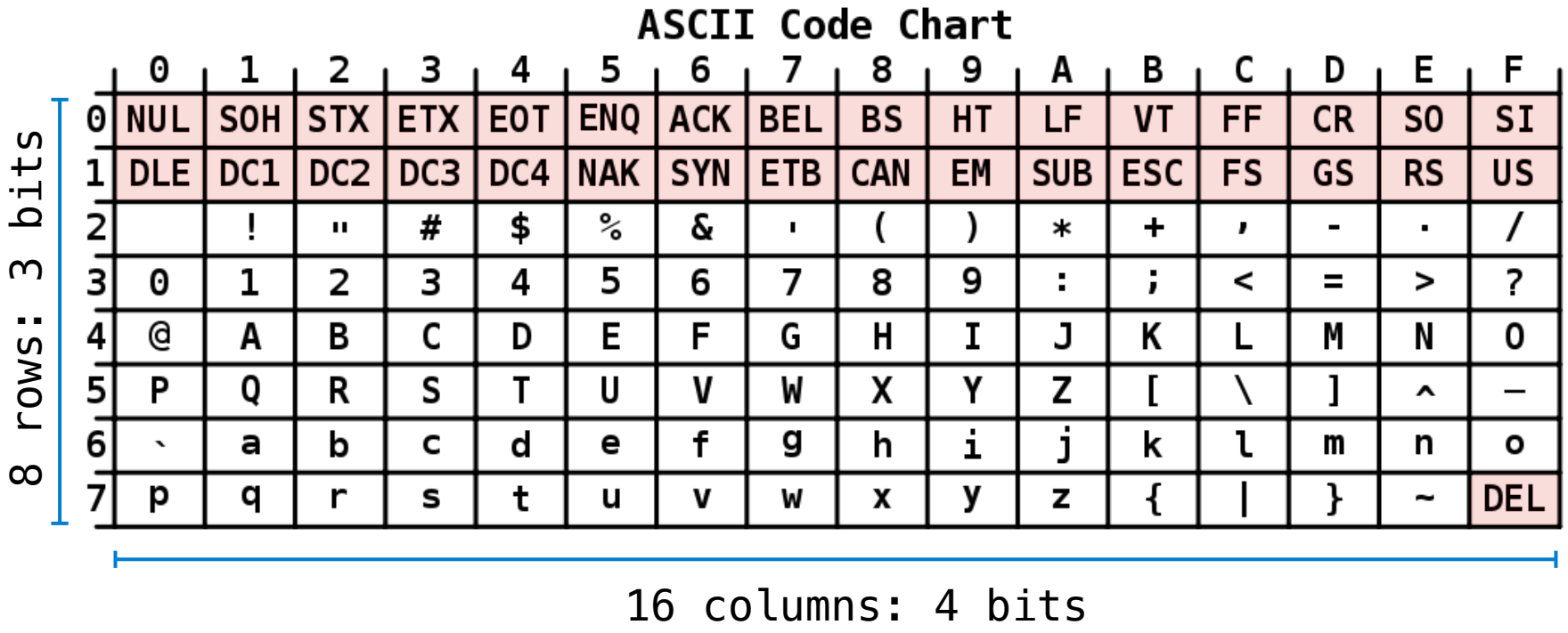

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
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2		!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
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5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
6	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	DEL

- Layout was chosen to support sorting by character code

Representing Strings: the ASCII Standard

Bonus Material

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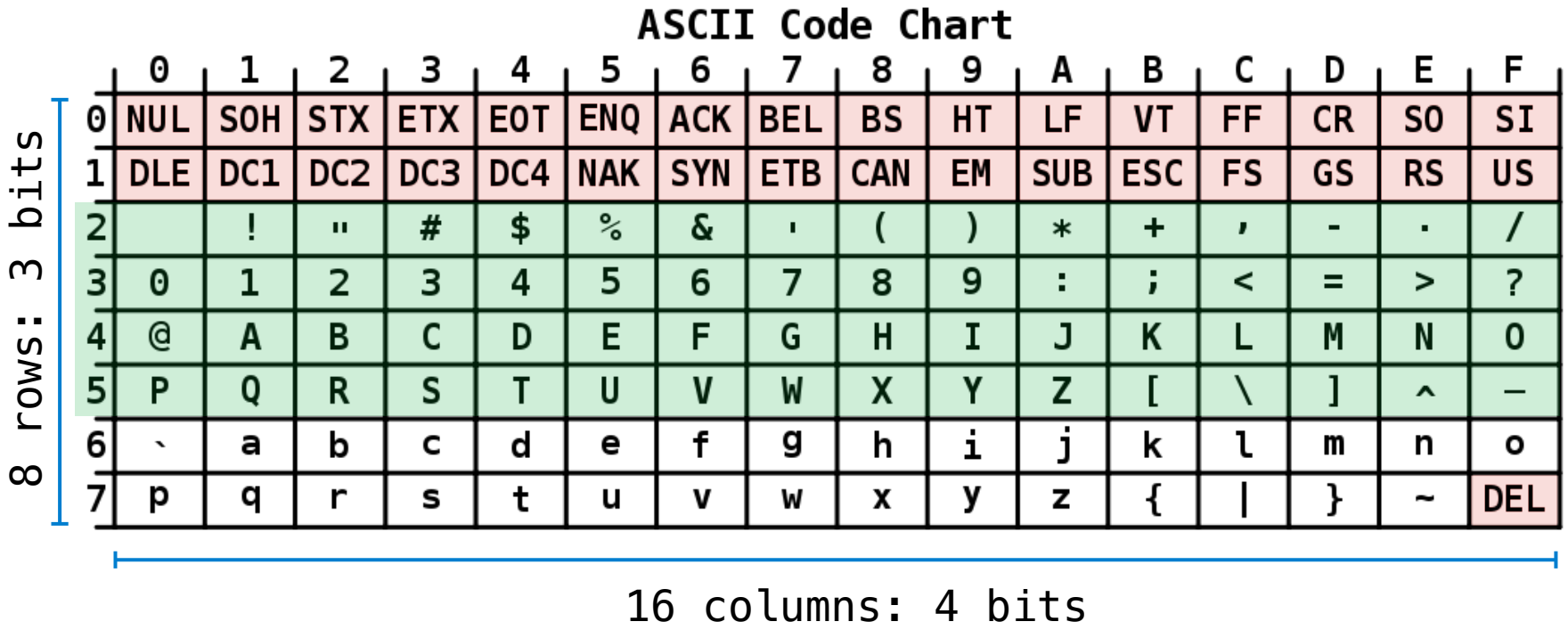

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3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
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5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
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7	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	DEL

- Layout was chosen to support sorting by character code
- Rows indexed 2–5 are a useful 6-bit (64 element) subset

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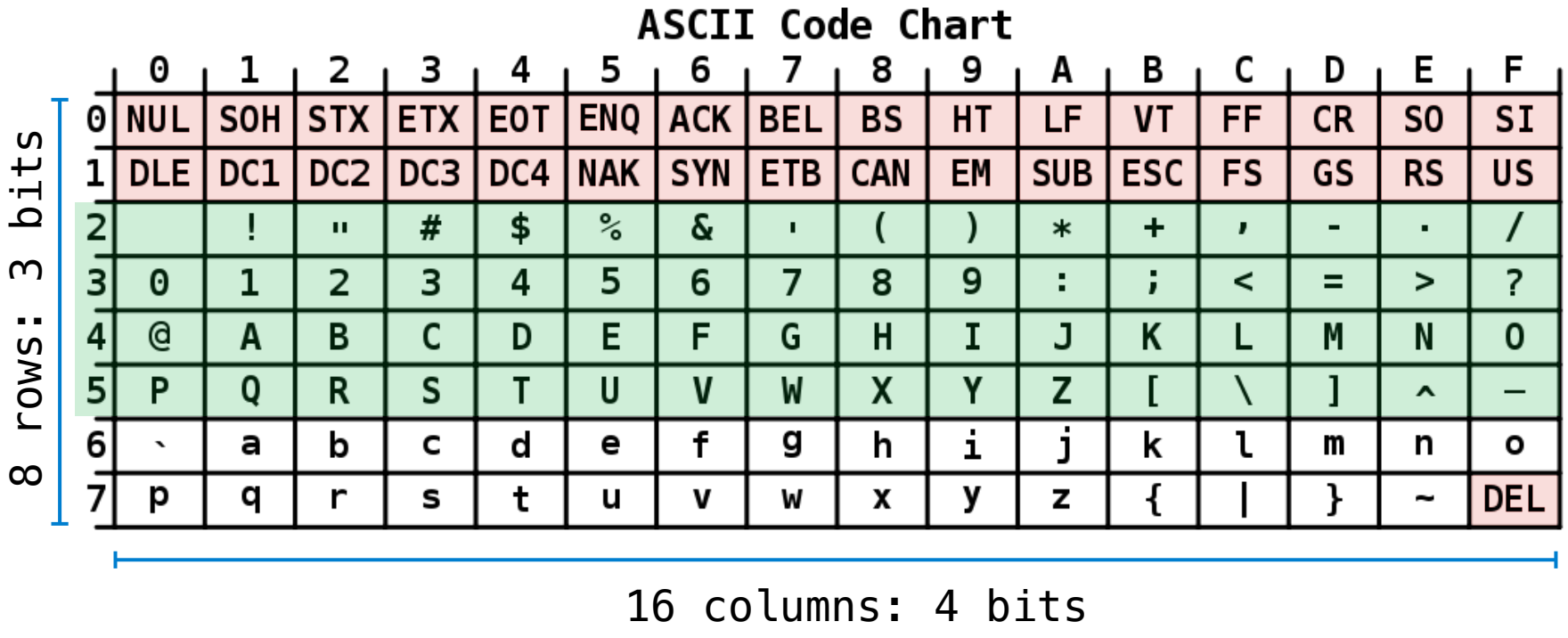

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2		!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
6	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	DEL

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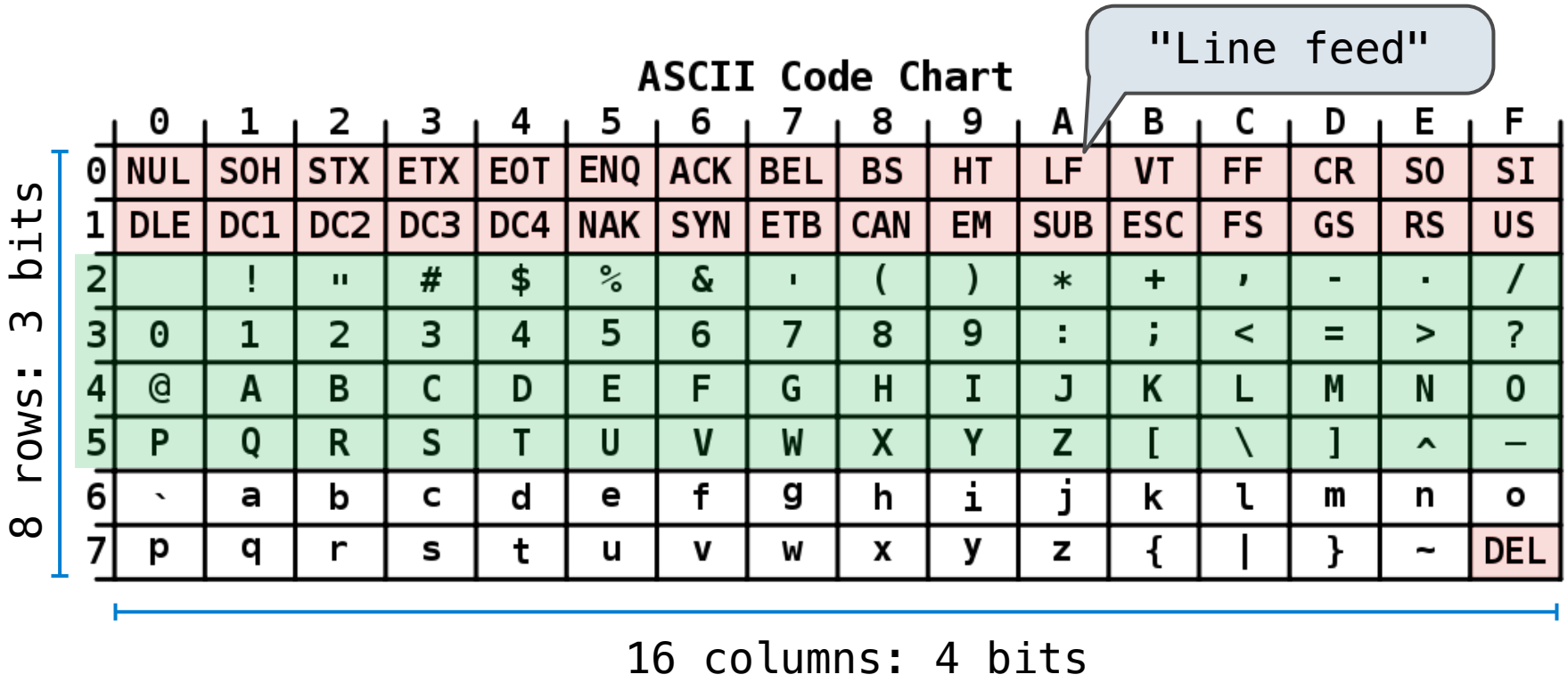
Representing Strings: the ASCII Standard

Bonus Material

American Standard Code for Information Interchange



	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	SOH	STX	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
1	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
2		!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
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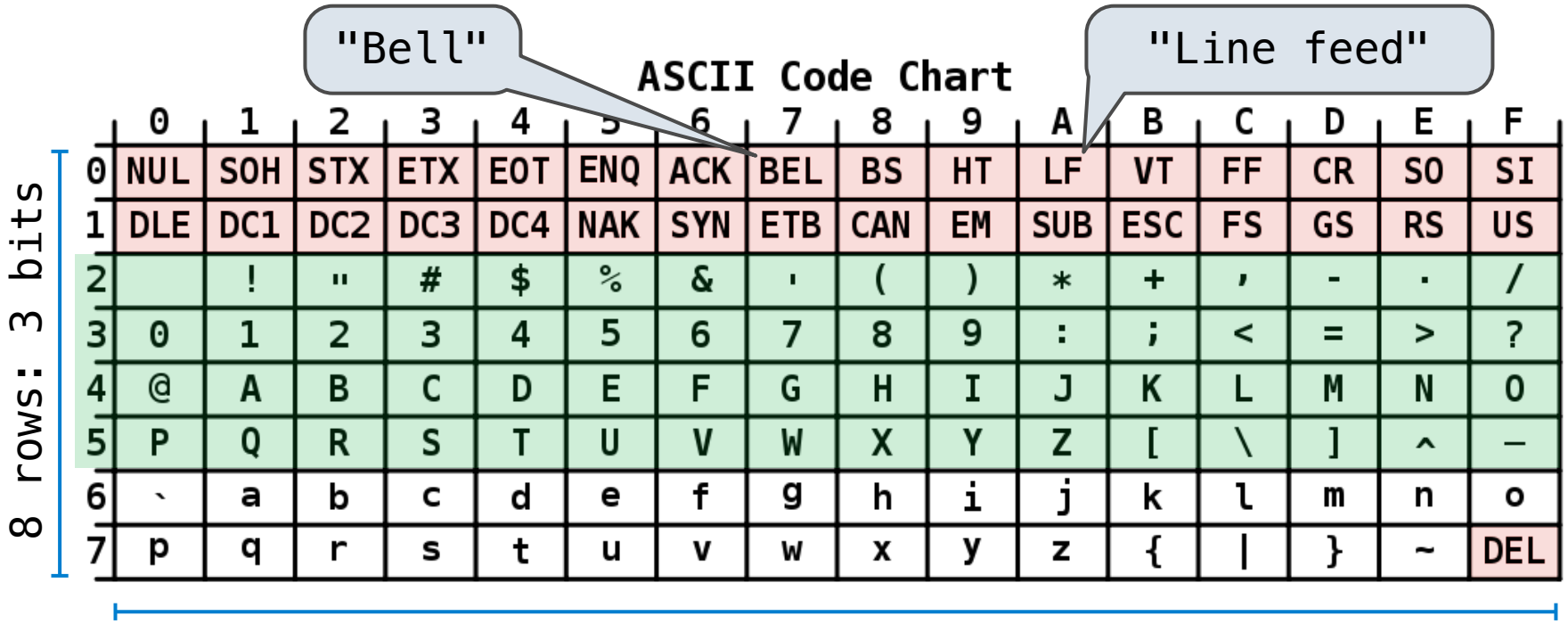

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2		!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
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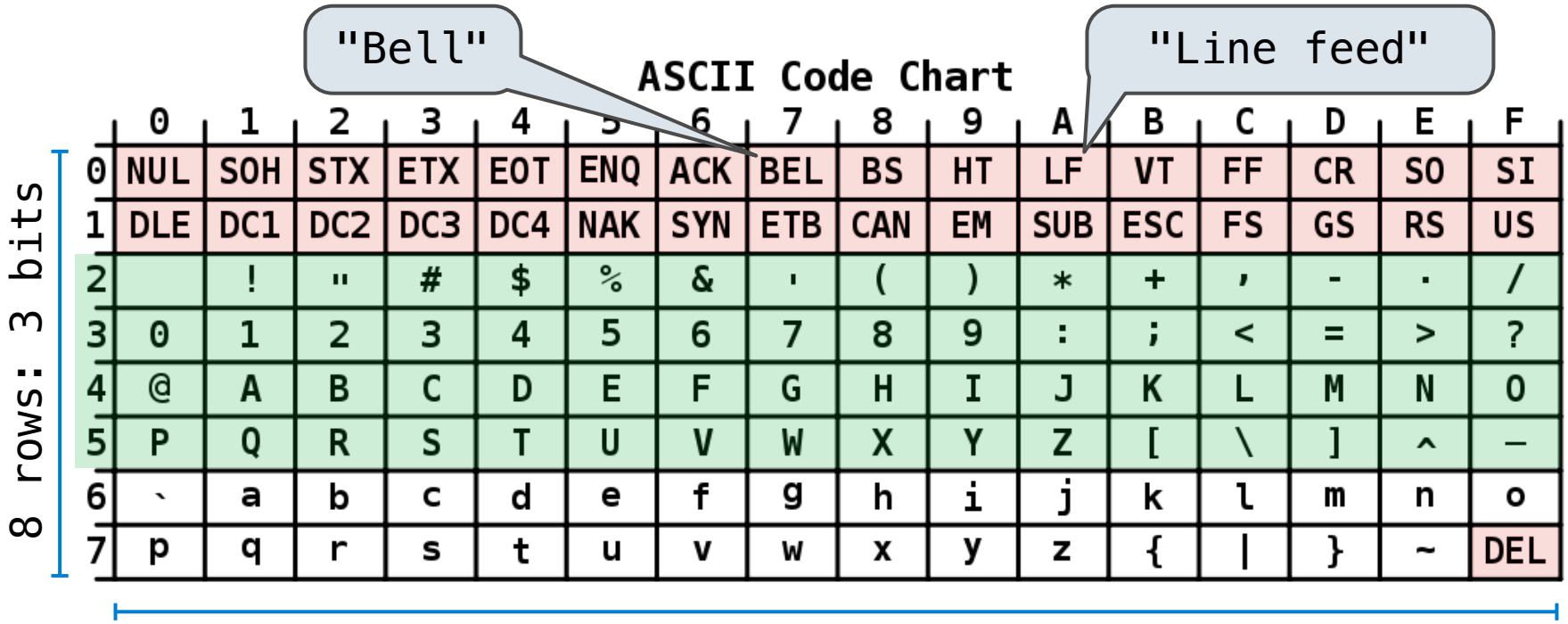

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Bonus Material

8071	8072	8073	8074	8075	8076	8077	8078
8171	8172	8173	8174	8175	8176	8177	8178
8271	8272	8273	8274	8275	8276	8277	8278
8371	8372	8373	8374	8375	8376	8377	8378

http://ian-albert.com/unicode_chart/unichart-chinese.jpg

Representing Strings: the Unicode Standard

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Demo

Representing Strings: UTF-8 Encoding

Bonus Material

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Bonus Material

UTF (UCS (Universal Character Set) Transformation Format)

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      bytes                         integers
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Sequences as Conventional Interfaces

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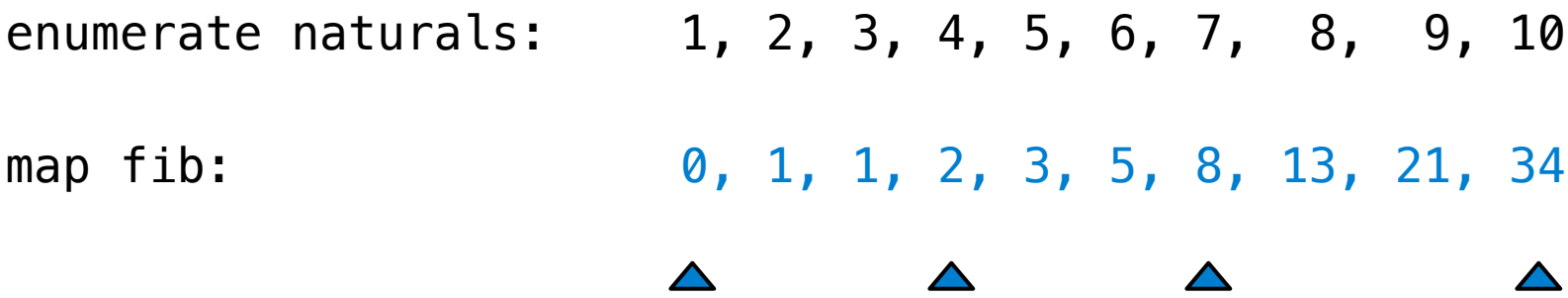

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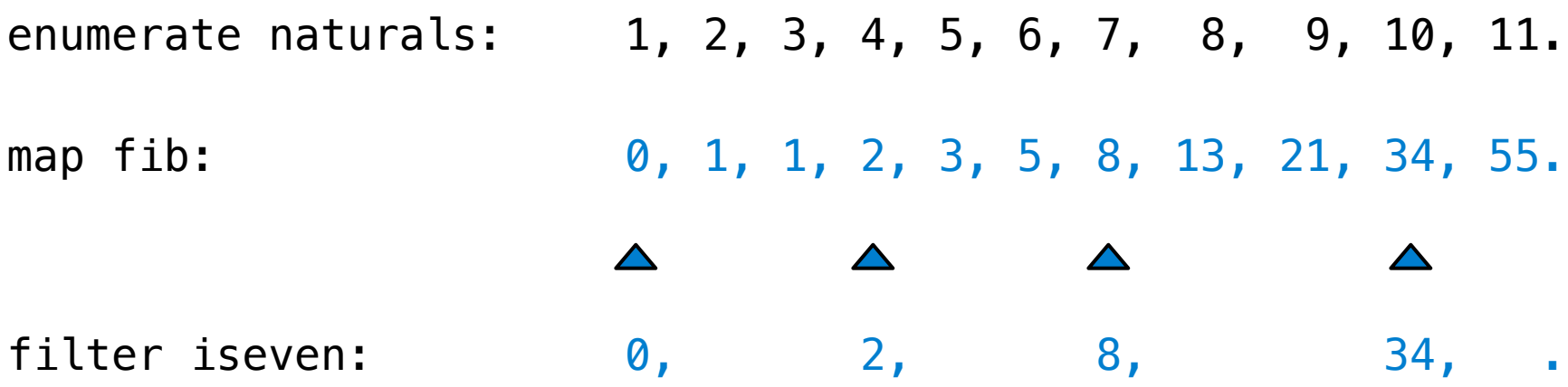

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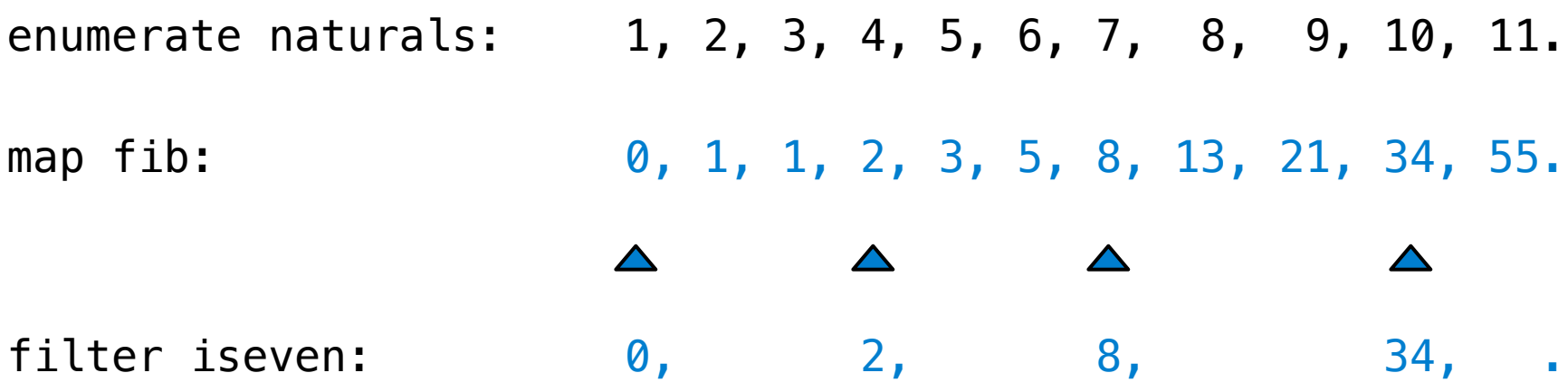

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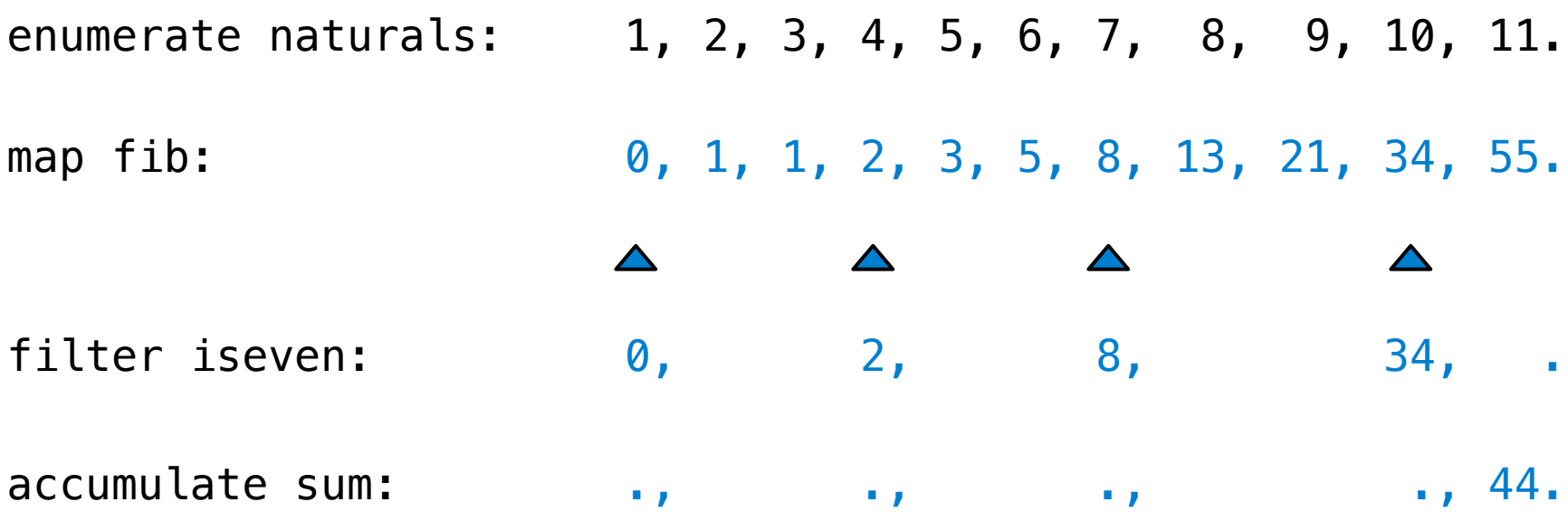

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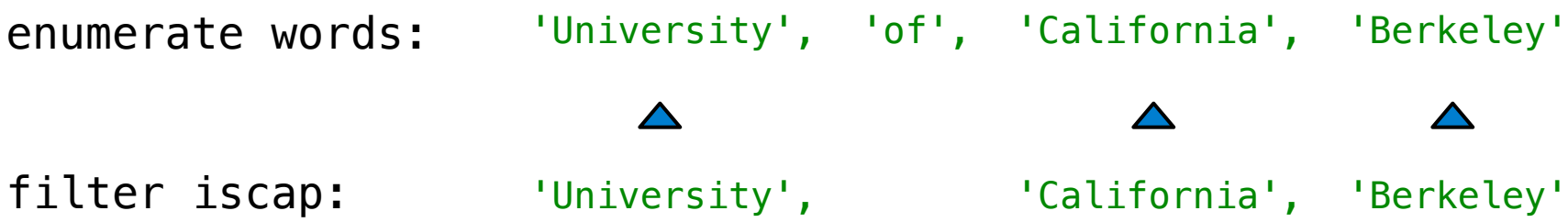

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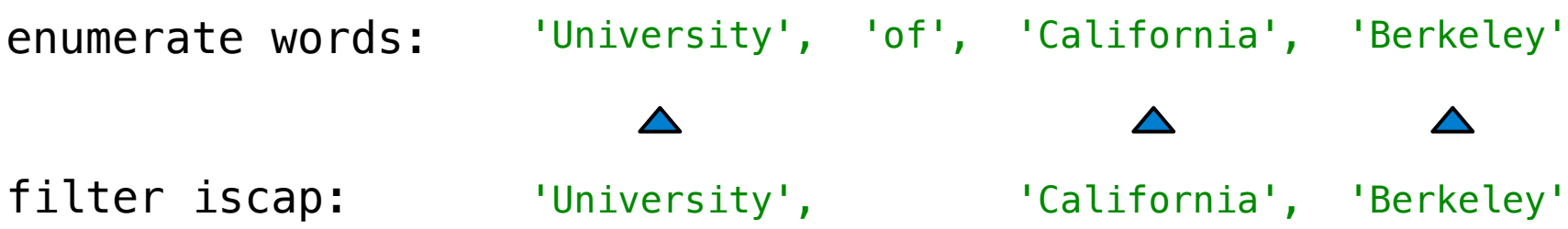

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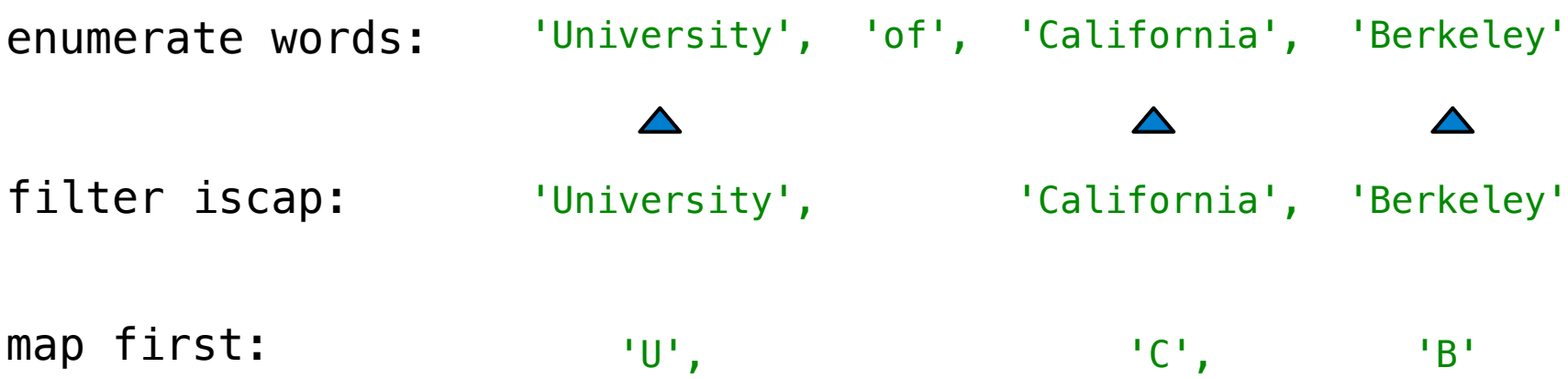

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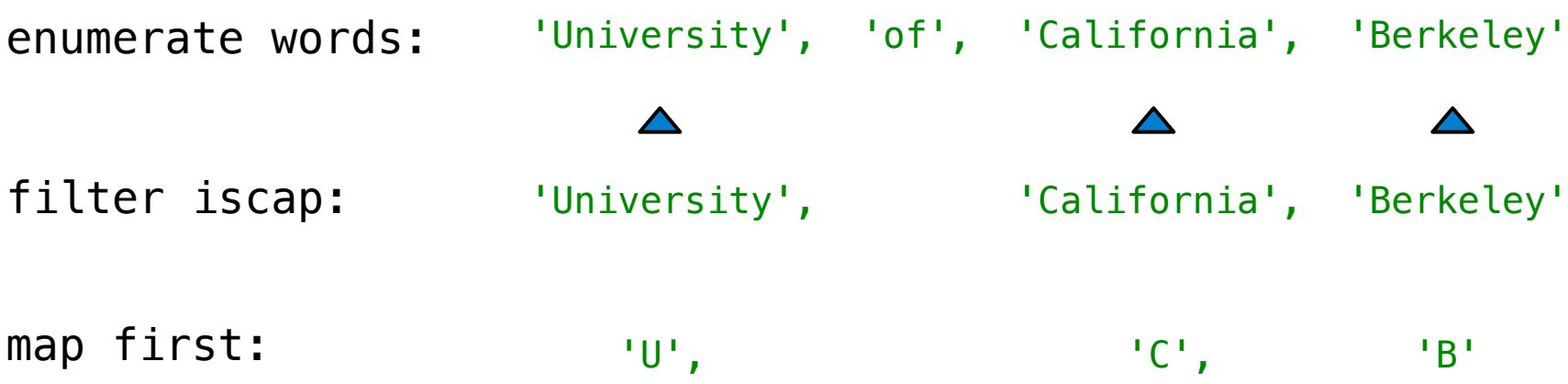

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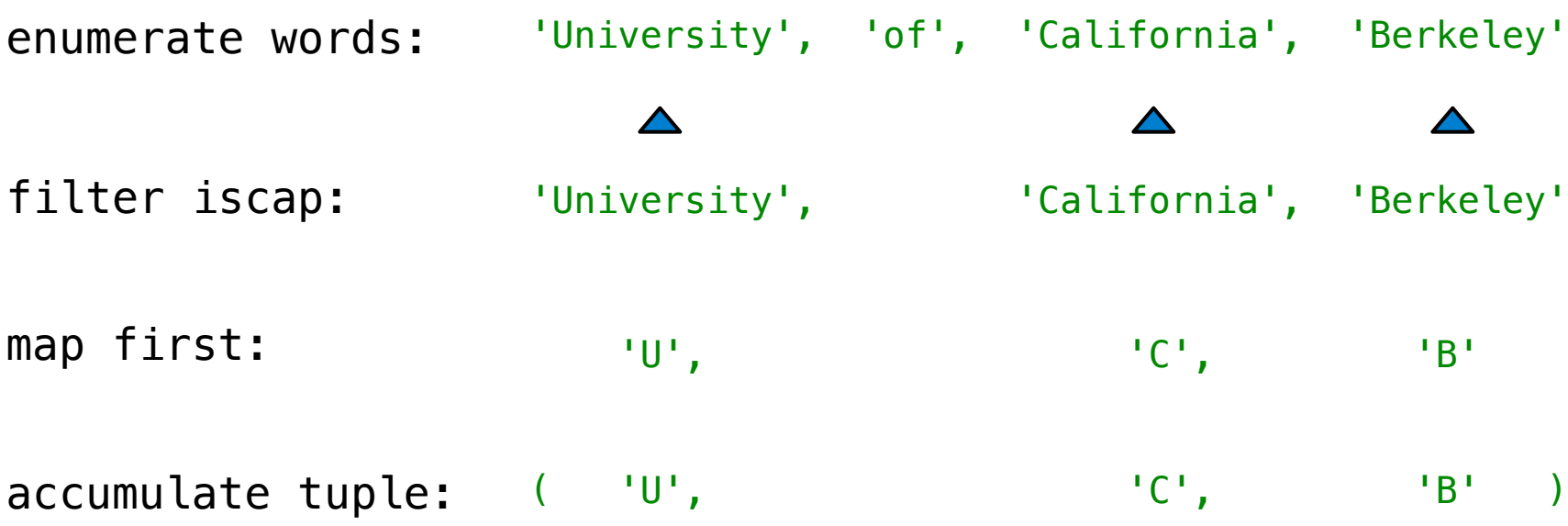

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Demo

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120
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First argument:
A two-argument
function

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120
```

First argument: A two-argument function

Second argument: an iterable object

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>>> from operator import mul

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>>> reduce(mul, (1, 2, 3, 4, 5))
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First argument: A two-argument function

Second argument: an iterable object

Like accumulate from Homework 2, but with iterable objects