laboratory medical immunology

Erasmus MC
University Medical Center Rotterdam

Crazy Sequential Representations (CSR)

Anne Bras

CSR - CRAZY SEQUENTIAL REPRESENTATIONS

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```
- 9 / 8 * ( 7 - 6 + 5 ) ^ 4 + 3 * 2 1
```

CSR - CRAZY SEQUENTIAL REPRESENTATIONS - DIGITS

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- 9 / 8 * (7 - 6 + 5) ^ 4 + 3 * 2 1

CSR - CRAZY SEQUENTIAL REPRESENTATIONS - DIGITS

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```
- 1 / 2 * ( 3 - 4 + 5 ) ^ 6 + 7 * 8 9
```

CSR - CRAZY SEQUENTIAL REPRESENTATIONS

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```
- 1 / 2 * ( 3 - 4 + 5 ) ^ 6 + 7 * 8 9
```

CSR - CRAZY SEQUENTIAL REPRESENTATIONS - CONCATENATION

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- 1 / 2 * (3 - 4 + 5) ^ 6 + 7 * 8 9

CSR - CRAZY SEQUENTIAL REPRESENTATIONS - CONCATENATION

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- 1 / 2 * (3 - 4 + 5) ^ 6 + 7 * 8 9

CSR - CRAZY SEQUENTIAL REPRESENTATIONS

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```
- 1 / 2 * ( 3 - 4 + 5 ) ^ 6 + 7 * 8 9
```

CSR - CRAZY SEQUENTIAL REPRESENTATIONS - OPERATIONS

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- 1 / 2 * (3 - 4 + 5) ^ 6 + 7 * 8 9

CSR - CRAZY SEQUENTIAL REPRESENTATIONS - OPERATIONS

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- 1 / 2 * (3 - 4 + 5) ^ 6 + 7 * 8 9

CSR - CRAZY SEQUENTIAL REPRESENTATIONS - OPERATIONS

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```
- 1 / 2 * ( 3 - 4 + 5 ) ^ 6 + 7 * 8 9
```

CSR - CRAZY SEQUENTIAL REPRESENTATIONS - OPERATIONS

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- 1 / 2 * (3 - 4 + 5) ^ 6 + 7 * 8 9

CSR - CRAZY SEQUENTIAL REPRESENTATIONS - OPERATIONS

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- 1 / 2 * (3 - 4 + 5) ^ 6 + 7 * 8 9

CSR - CRAZY SEQUENTIAL REPRESENTATIONS

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```
- 1 / 2 * ( 3 - 4 + 5 ) ^ 6 + 7 * 8 9
```

CSR - CRAZY SEQUENTIAL REPRESENTATIONS - PARENTHESIS

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```
- 1 / 2 * ( 3 - 4 + 5 ) ^ 6 + 7 * 8 9
```

CSR - CRAZY SEQUENTIAL REPRESENTATIONS

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```
- 1 / 2 * ( 3 - 4 + 5 ) ^ 6 + 7 * 8 9
```

CSR - CRAZY SEQUENTIAL REPRESENTATIONS - NEGATION

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```
- 1 / 2 * ( 3 - 4 + 5 ) ^ 6 + 7 * 8 9
```

CSR - CRAZY SEQUENTIAL REPRESENTATIONS - NEGATION

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- 1 / 2 * (3 - 4 + 5) ^ 6 + 7 * 8 9

CSR - CRAZY SEQUENTIAL REPRESENTATIONS - NEGATION

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```
- 1 / 2 * ( 3 - 4 + 5 ) ^ 6 + 7 * 8 9
```

CSR - CRAZY SEQUENTIAL REPRESENTATIONS

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```
- 1 / 2 * ( 3 - 4 + 5 ) ^ 6 + 7 * 8 9
```

CSR FOR 0 UP TO 11111

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0000000000	12+34-56-7+8+9	98-7-6-54-32+1
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
00000011111	1*23*456+7*89	-9+8*7-6*(5-43^2*1)

CSR FOR 0 UP TO 11111

0	12+34-56-7+8+9	98-7-6-54-32+1
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
00000**11111**	1*23*456+7*89	-9+8*7-6*(5-43^2*1)

CSR FOR 0 UP TO 11111

0000000000	12+34-56-7+8+9	98-7-6-54-32+1
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
11111	1*23*456+7*89	-9+8*7-6*(5-43^2*1)

CSR FOR 0 UP TO 11111

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0000000000	12+34-56-7+8+9	98-7-6-54-32+1
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
00000011111	1*23*456+7*89	-9+8*7-6*(5-43^2*1)

CSR FOR 0 UP TO 11111

0000000000	12+34-56-7+8+9	98-7-6-54-32+1
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
00000 11111	1*23*456+7*89	-9+8*7-6*(5-43^2*1)

CSR FOR 0 UP TO 11111

0000000000	12+34-56-7+8+9	98-7-6-54-32+1
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
00000 11111	1*23*456+7*89	-9+8*7-6*(5-43^2*1)

CSR FOR 0 UP TO 11111

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0000000000	12+34-56-7+8+9	98-7-6-54-32+1
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
00000011111	1*23*456+7*89	-9+8*7-6*(5-43^2*1)

CSR FOR 0 UP TO 11111

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0000000000	12+34-56-7+8+9	98-7-6-54-32+1
##########	@	@
##########	@	@
##########	@	@
##########	@	@
#####10958	???	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
00000111111	1*23*456+7*89	-9+8*7-6*(5-43^2*1)

CSR FOR 0 UP TO 11111

```
0000000000      12+34-56-7+8+9
##########      @
##########      @
##########      @
##########      @
#####10958      Identify via brute force search?
##########      @
##########      @
##########      @
##########      @
00000111111     1*23*456+7*89
```

LOOP

A ? B ? C ? D

LOOP

LOOP - OPERATIONS

A	+	B	+	C	+	D
	-		-		-	
	*		*		*	
	/		/		/	
	^		^		^	

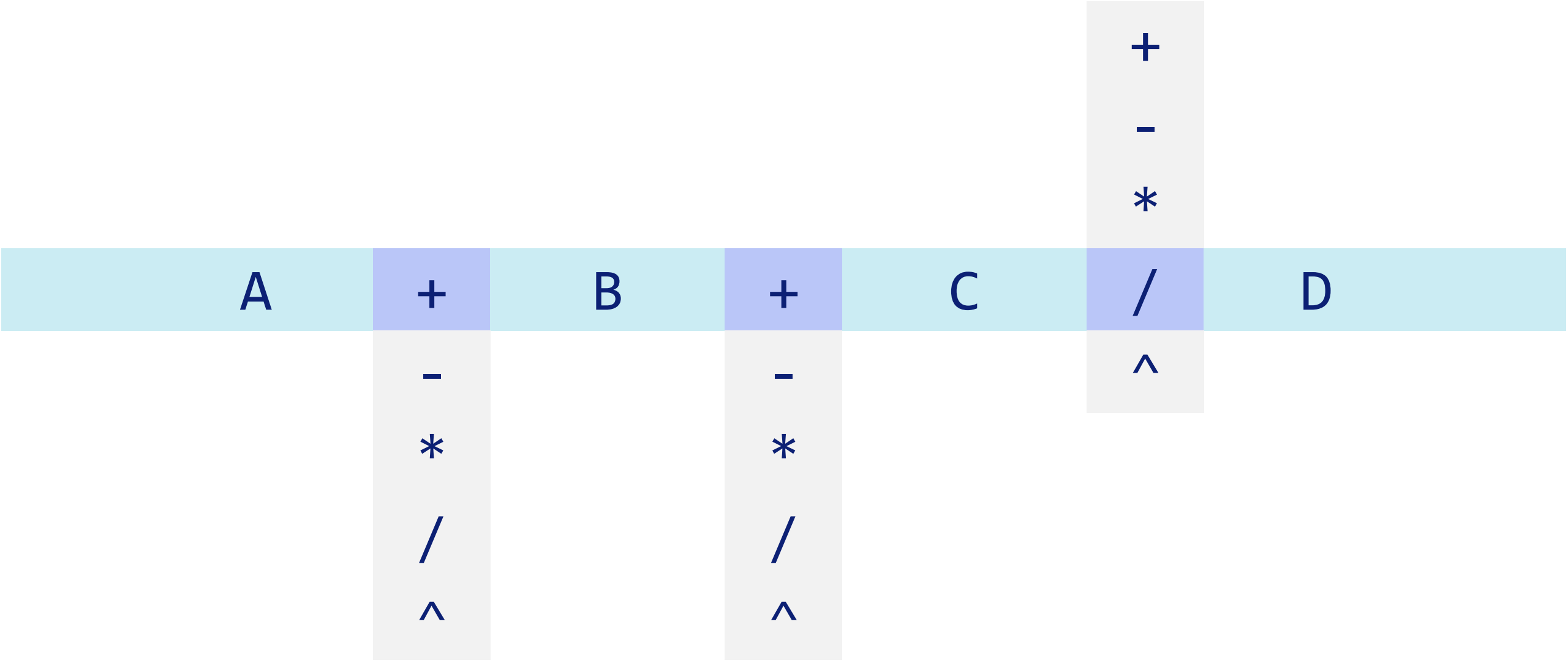
LOOP - OPERATIONS

					+	
A	+	B	+	C	-	D
	-		-		*	
	*		*		/	
	/		/		^	
	^		^			

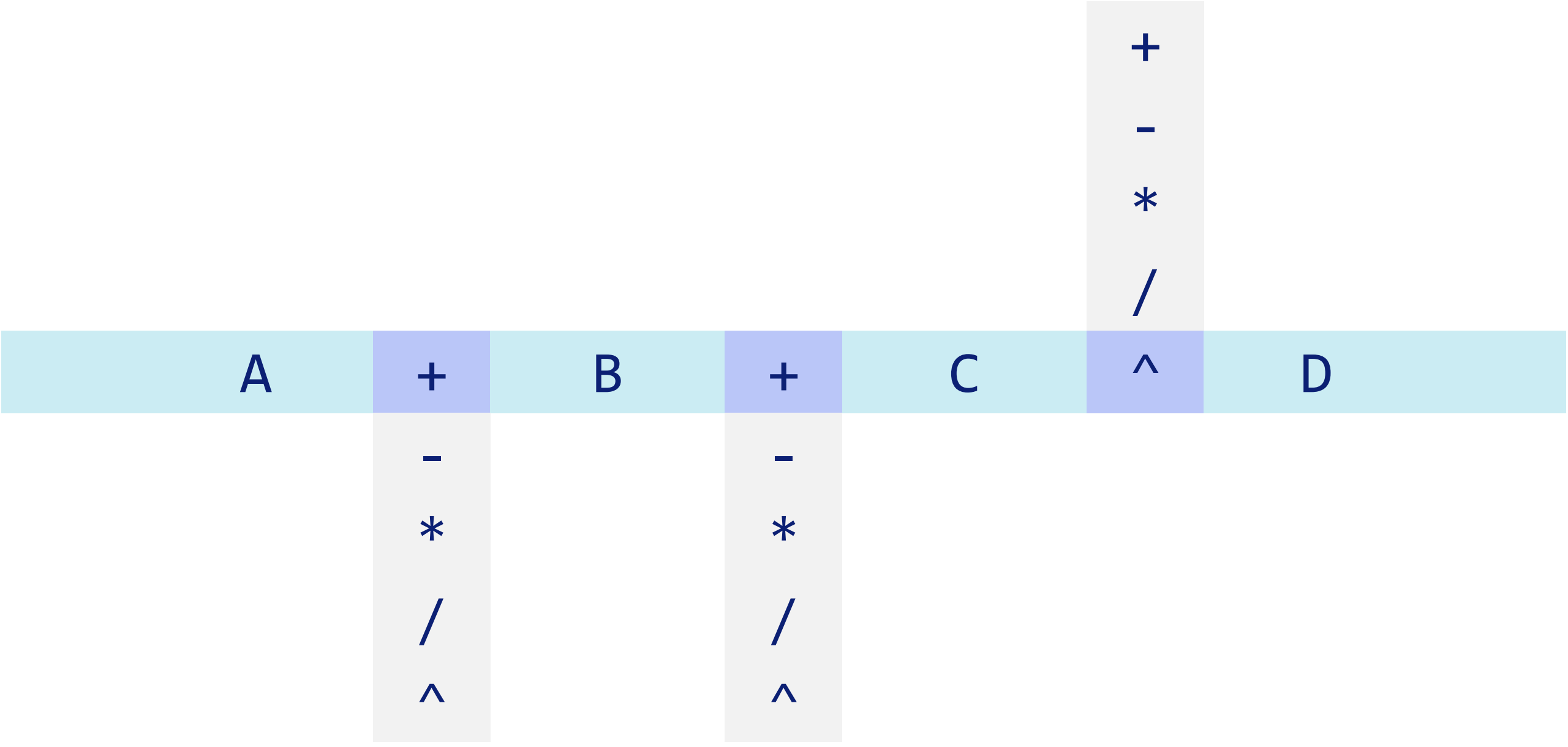
LOOP - OPERATIONS

								+				
								-				
A		+		B		+		C		*		D
		-				-				/		
		*				*				^		
		/				/						
		^				^						

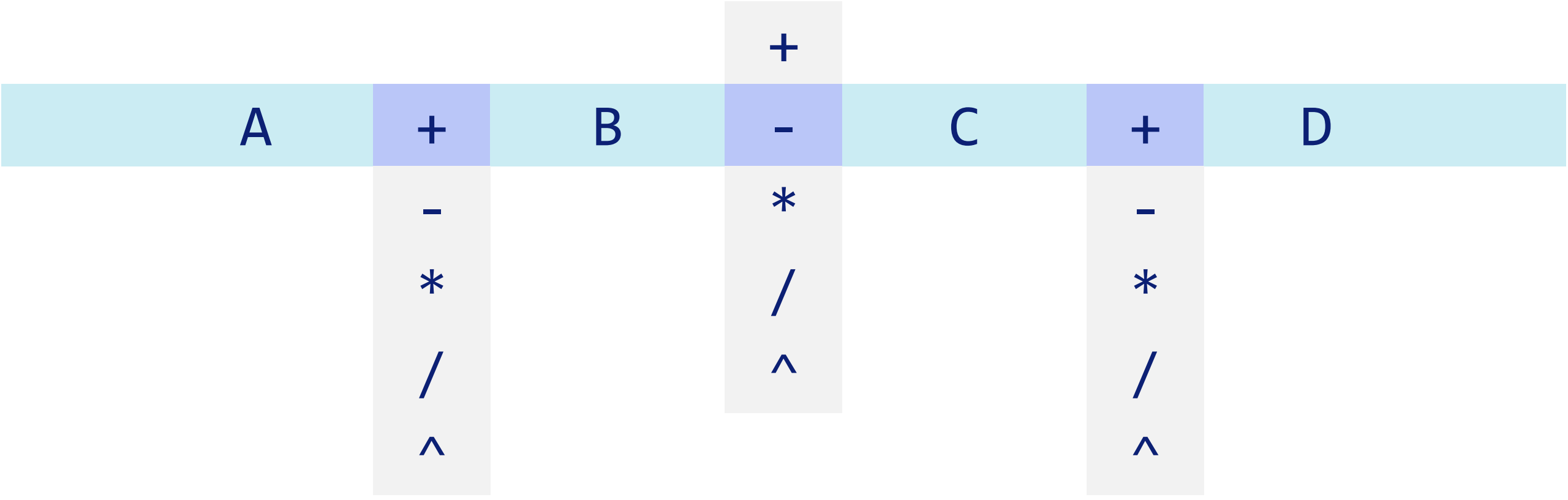
LOOP - OPERATIONS



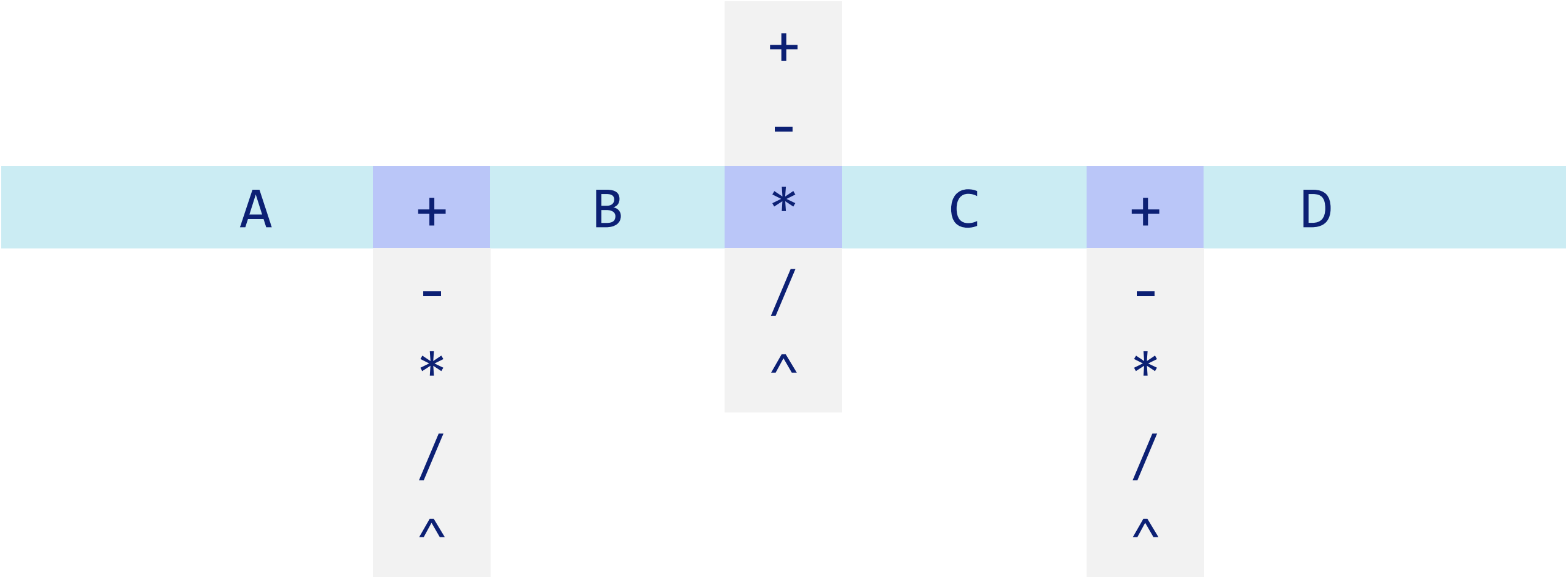
LOOP - OPERATIONS



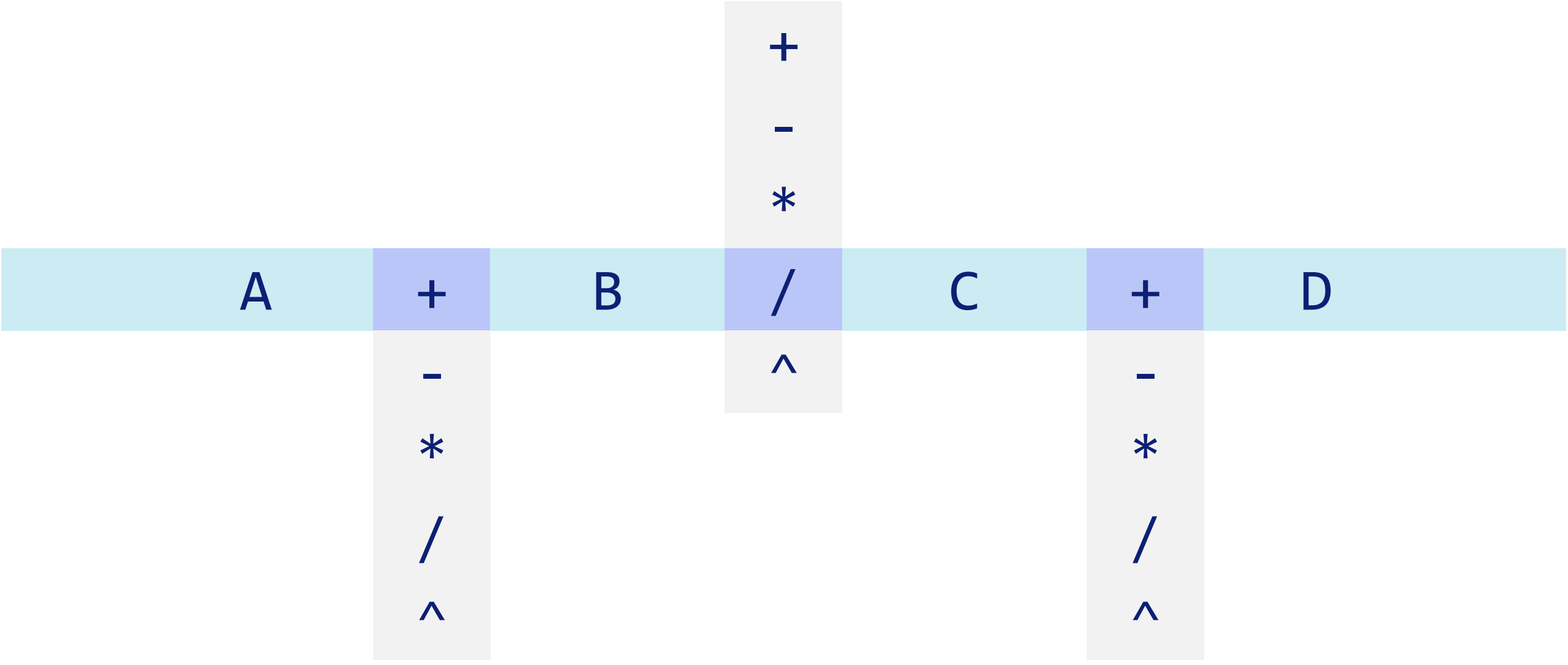
LOOP - OPERATIONS



LOOP - OPERATIONS



LOOP - OPERATIONS



LOOP - ARGUMENTS

A + B / C + D

LOOP - ARGUMENTS

1	+	2	/	3	+	456789
1		2		34		56789
1		2		345		6789
1		2		3456		789
1		2		34567		89

LOOP - ARGUMENTS

1		2		3		456789
1	+	2	/	34	+	56789
1		2		345		6789
1		2		3456		789
1		2		34567		89
1		2		345678		9

LOOP - ARGUMENTS

1		2		3		456789
1		2		34		56789
1	+	2	/	345	+	6789
1		2		3456		789
1		2		34567		89
1		2		345678		9
1		23		45678		9

LOOP – ARGUMENTS

1		2		3		456789
1		2		34		56789
1		2		345		6789
1	+	2	/	3456	+	789
1		2		34567		89
1		2		345678		9
1		23		45678		9
1		234		5678		9

LOOP - ARGUMENTS

	987654	+	3	/	2	+	1	
	98765		43		2		1	
	9876		543		2		1	
	987		6543		2		1	
	98		76543		2		1	

LOOP - ARGUMENTS

987654		3		2		1
98765	+	43	/	2	+	1
9876		543		2		1
987		6543		2		1
98		76543		2		1
9		876543		2		1

LOOP - ARGUMENTS

987654		3		2		1
98765		43		2		1
9876	+	543	/	2	+	1
987		6543		2		1
98		76543		2		1
9		876543		2		1
9		87654		32		1

LOOP - ARGUMENTS

987654		3		2		1
98765		43		2		1
9876		543		2		1
987	+	6543	/	2	+	1
98		76543		2		1
9		876543		2		1
9		87654		32		1
9		8765		432		1

LOOP - PARENTHESES

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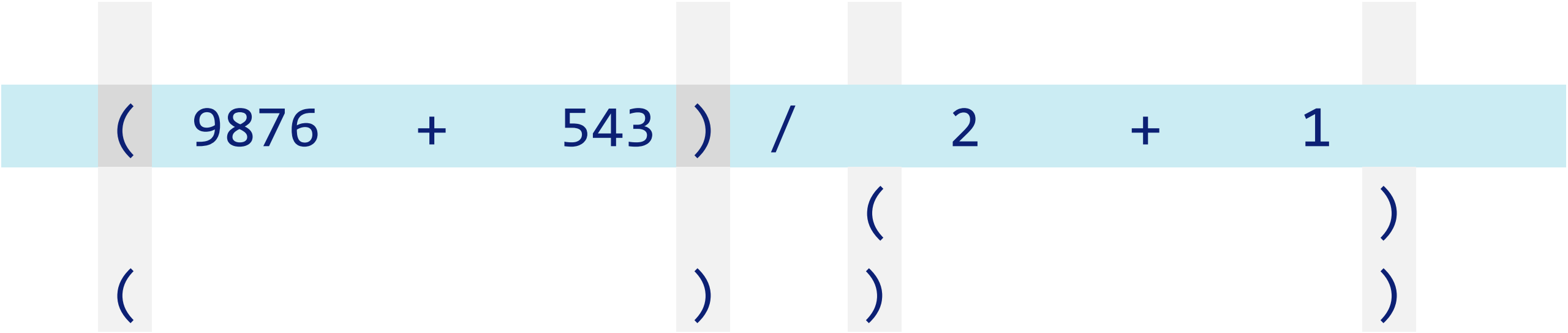
```
9876 + 543 / 2 + 1
```

LOOP – PARENTHESES

	9876	+	543		/		2	+	1	
(				)						
						(				)
(				)		)				)

LOOP - PARENTHESES



LOOP – PARENTHESES

( )

(9876 + 543 / (2 + 1)

( ) ( )

LOOP - PARENTHESES

LOOP - NEGATES

```
( 9876 + 543 ) / ( 2 + 1 )
```

LOOP - NEGATES

```
( 9876 + 543 ) / ( 2 + 1 )
  -                -
  -                -
```

LOOP - NEGATES

```
( -9876   +   543 ) /  (  2    +    1 )
-                      -
                       -
```

LOOP – NEGATES

	–							–		
(		9876	+	543	)	/	(	-	2	+ 1)
	–							–		

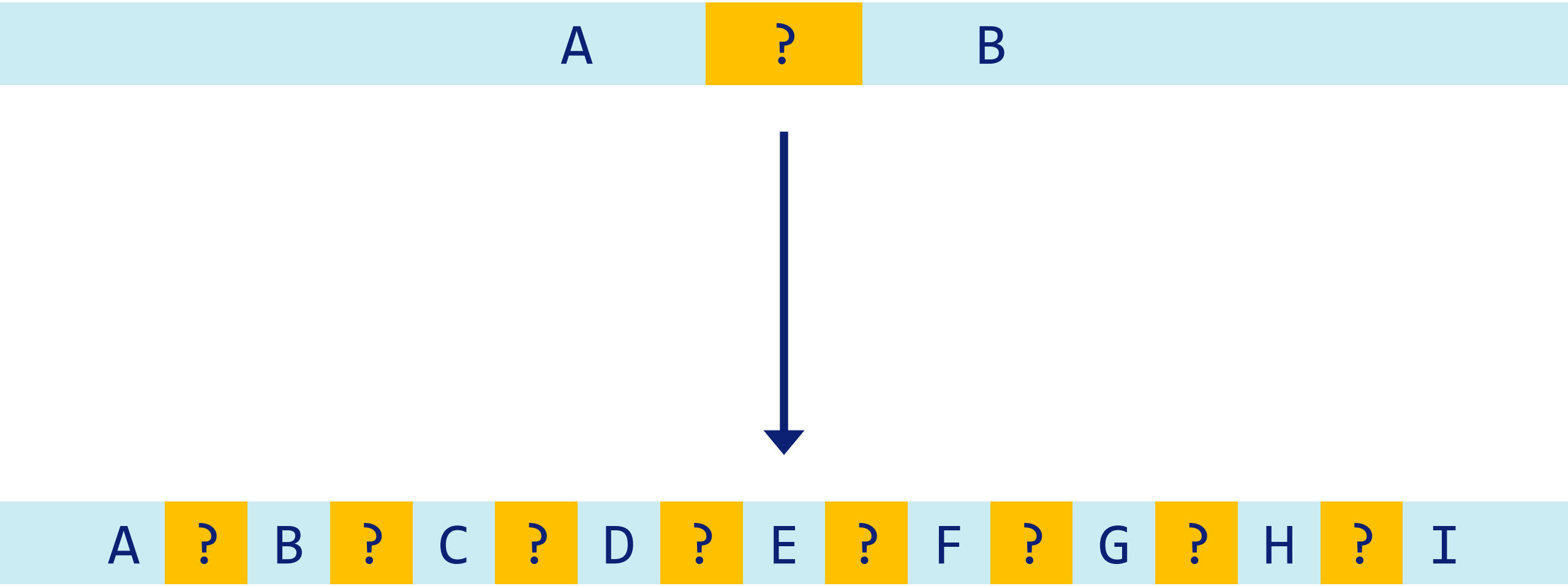
LOOP - NEGATES

```
    -                   -
( -9876   +   543 ) / ( -2    +   1 )
```

LOOP

LOOP

LOOP



LOOP - PSEUDOCODE

```
for(n in 1:8)
```

LOOP - PSEUDOCODE

```
for(n in 1:8)
  for(o in operations(n))
```

LOOP - PSEUDOCODE

```
for(n in 1:8)
  for(o in operations(n))
    for(a in arguments(n))
```

LOOP – PSEUDOCODE

```
for(n in 1:8)
  for(o in operations(n))
    for(a in arguments(n))
      for(p in parentheses(n))
```

LOOP - PSEUDOCODE

```
for(n in 1:8)
  for(o in operations(n))
    for(a in arguments(n))
      for(p in parentheses(n))
        for(n in negates(n))
```

LOOP – PSEUDOCODE

```
for(n in 1:8)
  for(o in operations(n))
    for(a in arguments(n))
      for(p in parentheses(n))
        for(n in negates(n))
            counter <- counter + 1
```

LOOP – PSEUDOCODE

```
for(n in 1:8)
  for(o in operations(n))
    for(a in arguments(n))
      for(p in parentheses(n))
        for(n in negates(n))
            counter <- counter + 1


counter
[1] 725045142720
```

OPTIMAZATIONS

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OPTIMAZATIONS

Parentheses

```
(123+456)+780
```

```
123+(456+780)
```

OPTIMAZATIONS

Parentheses

```
(123+456)+780
123+(456+780)
```

Negations

```
-1*-3456789
1*23456789
```

EVALUATION – COMPLEX

```
> 9 + 8765 / 43 ^ 21
```

EVALUATION – COMPLEX

```
> 9 + 8765 / 43 ^ 21
[1] 9
```

EVALUATION – COMPLEX

```
> 9 + 8765 / 43 ^ 21
[1] 9

> 9 + 8765 / 2008341521442811032096543687424 2043
```

EVALUATION – COMPLEX

```
> 9 + 8765 / 43 ^ 21
[1] 9

> 9 + 8765 / 2008341521442811032096543687424 2043
```

EVALUATION – COMPLEX

```
> 9 + 8765 / 43 ^ 21
[1] 9

> 9 + 8765 / 2008341521442811032096543687424 2043
```

EVALUATION – COMPLEX

```
> 9 + 8765 / 43 ^ 21
[1] 9

> 9 + 8765 / 2008341521442811032096543687424 2043
```

EVALUATION - COMPLEX

```
> 9 + 8765 / 43 ^ 21
[1] 9

> 9 + 8765 / 2008341521442811032096543687424 2043
[1] 9
```

EVALUATION – COMPLEX

```
> 9 + 8765 / 43 ^ 21
[1] 9

> 9 + 8765 / 2008341521442811032096543687424 2043
[1] 9

> library(Rmpfr)
[1] 9.000000000000000000000000000043642974
```

EVALUATION – COMPLEX

```
> (1-2-3+4)*5^6789
```

EVALUATION – COMPLEX

```
> (1-2-3+4)*5^6789
[1] NaN
```

EVALUATION – COMPLEX

```
> (1-2-3+4)*5^6789
[1] NaN

> 0*6^789
```

EVALUATION – COMPLEX

```
> (1-2-3+4)*5^6789
[1] NaN

> 0*6^789
```

EVALUATION – COMPLEX

```
> (1-2-3+4)*5^6789
[1] NaN

> 0*6^789
```

EVALUATION – COMPLEX

```
> (1-2-3+4)*5^6789
[1] NaN

> 0*6^789
[1] NaN
```

EVALUATION – COMPLEX

```
> (1-2-3+4)*5^6789
[1] NaN

> 0*6^789
[1] NaN

> library(RMaxima)
[1] 0
```

RESULTS

RESULTS

0000000000	12+34-56-7+8+9	98-7-6-54-32+1
##########	@	@
##########	@	@
##########	@	@
00000	11111	1*23*456+7*89	-9+8*7-6*(5-43^2*1)

RESULTS

0000000000	12+34-56-7+8+9	98-7-6-54-32+1
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
2147483647	-1+2^(34*5-67-8*9)	(9+8-7+6)^(5+4)/32-1

RESULTS

0000000000	12+34-56-7+8+9	98-7-6-54-32+1
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@ *n=931,165*	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
2147483647	-1+2^(34*5-67-8*9)	(9+8-7+6)^(5+4)/32-1

RESULTS

0000000000	12+34-56-7+8+9	98-7-6-54-32+1
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@ *n=931,165*	@ *n=1,333,676*
##########	@	@
##########	@	@
##########	@	@
##########	@	@
2147483647	-1+2^(34*5-67-8*9)	(9+8-7+6)^(5+4)/32-1

RESULTS

0000000000	12+34-56-7+8+9	98-7-6-54-32+1
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
2147483647	-1+2^(34*5-67-8*9)	(9+8-7+6)^(5+4)/32-1

RESULTS

0000000000	12+34-56-7+8+9	98-7-6-54-32+1
##########	@	@
##########	@	@
##########	@	@
##########	@	@
#####10958	@	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
2147483647	-1+2^(34*5-67-8*9)	(9+8-7+6)^(5+4)/32-1

RESULTS

0000000000	12+34-56-7+8+9	98-7-6-54-32+1
##########	@	@
##########	@	@
##########	@	@
##########	@	@
#####10958	???	@
##########	@	@
##########	@	@
##########	@	@
##########	@	@
2147483647	-1+2^(34*5-67-8*9)	(9+8-7+6)^(5+4)/32-1

RESULTS

$185 =$

123-4+56-7+8+9

123+4-5-6+78-9

1+234-56+7+8-9

123-4-5*6+7+89

123+4+56*7/8+9

12-3+4*5+67+89

12-3+45+6*7+89

1-2+34+56+7+89

12/3*45-67+8*9

1+2-345+67*8-9

1+2*34*5-67-89

1*2+34*56/7-89

1^23+45+67+8*9

RESULTS

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3921 =

1+23+4+5+6^7/8/9

1-(2+3)^4+567*8+9

1/2*3*4-5*(6-789)

1+(2*3-4)^5+6^7/8/9

RESULTS

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3921 =

1+23+4+5+6^7/8/9

1-(2+3)^4+567*8+9

1/2*3*4-5*(6-789)

1+(2*3-4)^5+6^7/8/9

RESULTS

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3921 =

1+23+4+5+6^7/8/9

1-(2+3)^4+567*8+9

1/2*3*4-5*(6-789)

1+(2*3-4)^5+6^7/8/9

RESULTS

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3921 =

1+23+4+5+6^7/8/9

1-(2+3)^4+567*8+9

1/2*3*4-5*(6-789)

1+(2*3-4)^5+6^7/8/9

RESULTS

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3921 =

1+23+4+5+6^7/8/9

1-(2+3)^4+567*8+9

1/2*3*4-5*(6-789)

1+(2*3-4)^5+6^7/8/9

AVAILABILITY

https://zenodo.org/record/3387558

Crazy Sequential Representations

a.e.bras@gmail.com

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RESULTS

185 =

1+2345/67-(8+9)
12+3+45+6-7*8+9
123+4*(56+7-89)
-1*2+3*45*6-789
-1*23+4*5-67+89
1*23+4+56/7/8-9
-12/3-4+5-67+89
-1-23-45+6-7+89
123+4*(56+7-89)
1-2*34+5-6+78+9
1+2*34-56+7+8-9
1+2345/67-(8+9)
-12/3-45+67-8+9