$\Pi, \tau \rightarrow |\Pi R| = |R|$

(bag) $\uplus \rightarrow |R \uplus S| = |R| + |S|$

$\times \rightarrow |R \times S| = |R| \times |S|$

(set) $\cup \rightarrow |R \cup S| = |\delta(R \uplus S)|$ (set / bag)

$\bowtie_c \rightarrow |R \bowtie_c S| = |\sigma_c(R \times S)|$

$\delta \rightarrow |\delta R| = |\gamma_{sch(R)} R|$

$\sigma_c \rightarrow ?$

$\not\gamma \rightarrow ?$

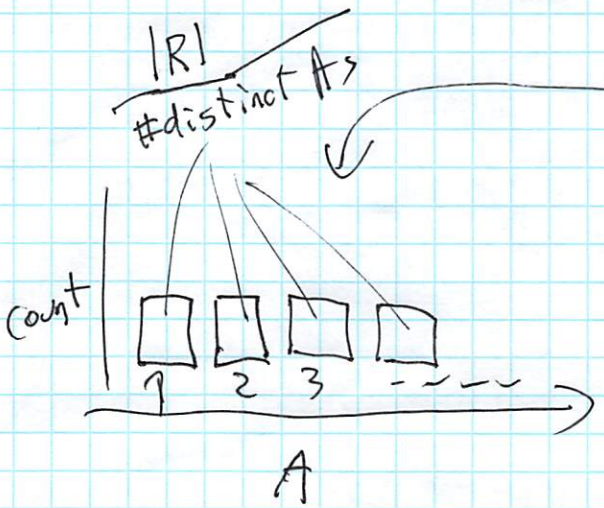
- $\sigma_{A=const}$

  statistics

  ↳ Idea 1: SELECT A, COUNT(*) FROM R GROUP BY A — perfect size estimate

  ↳ Idea 2: Min/Max count — upper/lower bound estimate

  ↳ Idea 3: #distinct A ≡ Min/Max A + size of R — Avg case estimate



- $\sigma_{const_1 < A < const_2}$

  $const_2 - const_1$ = # of satisfying A values

$$\frac{(const_2 - const_1) \cdot |R|}{\#\text{distinct } A\text{s}}$$

$$\Downarrow$$

$$\frac{const_2 - const_1}{Max(A) - min(A)}$$

$\sigma_{A=const}$

$\sigma_{const_1 < A < const_2}$

$\sigma_{A_1=A_2}$

$A_1 = b$ → $\frac{1}{\#\text{distinct } A_1}$ %

chance of passing

$a = A_2$ → $\frac{1}{\#\text{distinct } A_2}$ %

chance of passing

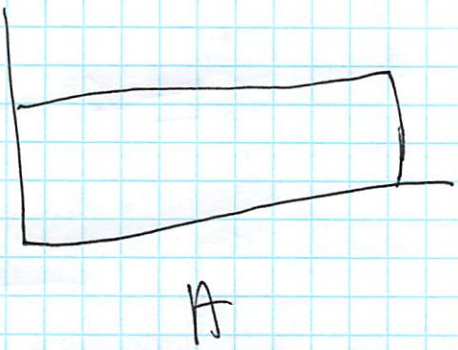
R	A_1	A_2
	<a	b>
	~~<a~~	~~a~~
	<c	b>
	<d	b>
	<f	e>
	<g	e>
	<h	e>

→ # of tuples with ~~b~~ $b = A_2$ × $\frac{1}{\#\text{distinct } A_1}$

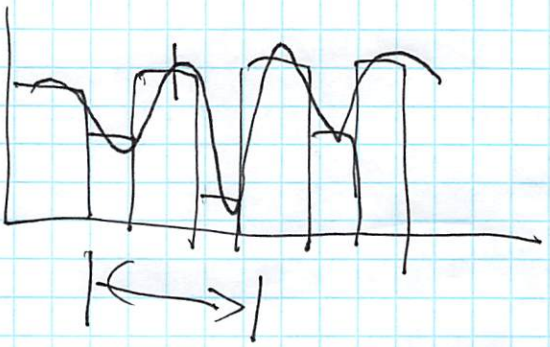
→ # of tuples with $e = A_2$

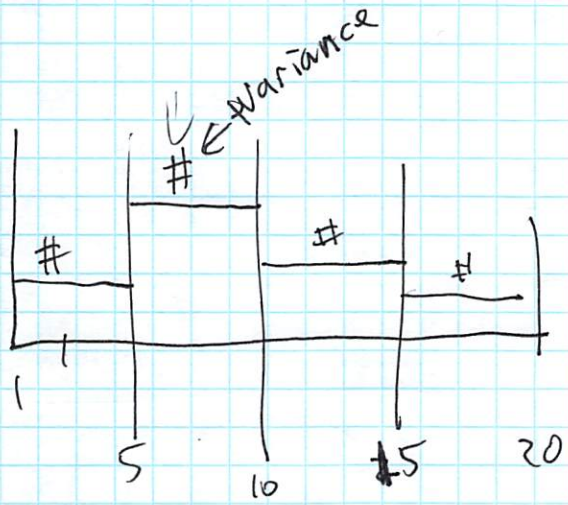
$\sigma_{C_1 \wedge C_2}$ → (Selectivity of σ_{C_1}) • (selectivity of σ_{C_2})

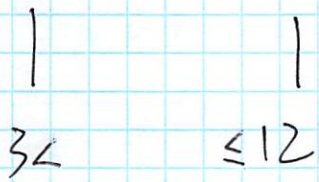
$\sigma_{C_1 \vee C_2}$ → $1 - (1 - (sel(\sigma_{C_1})) \cdot (1 - (sel(\sigma_{C_2}))$

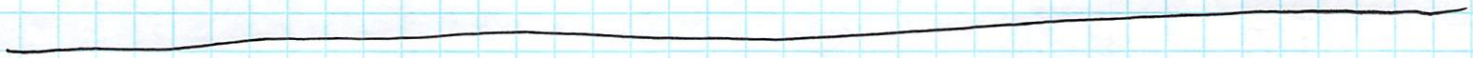


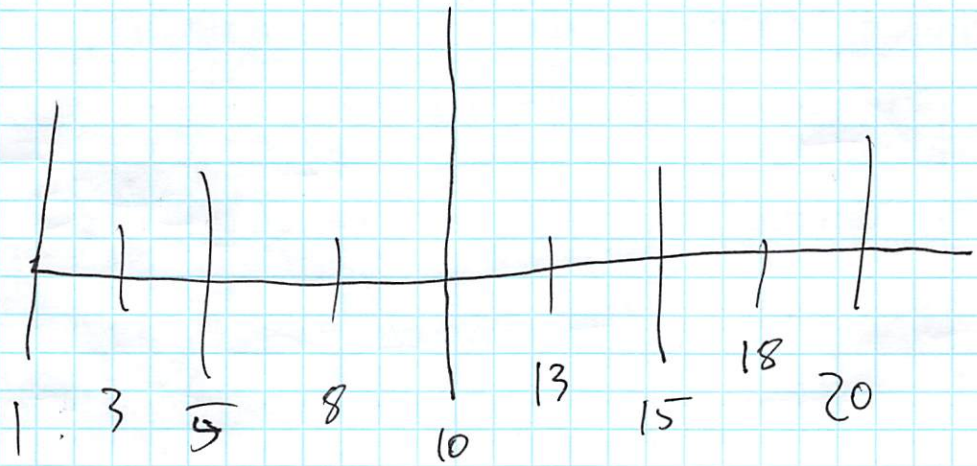
A







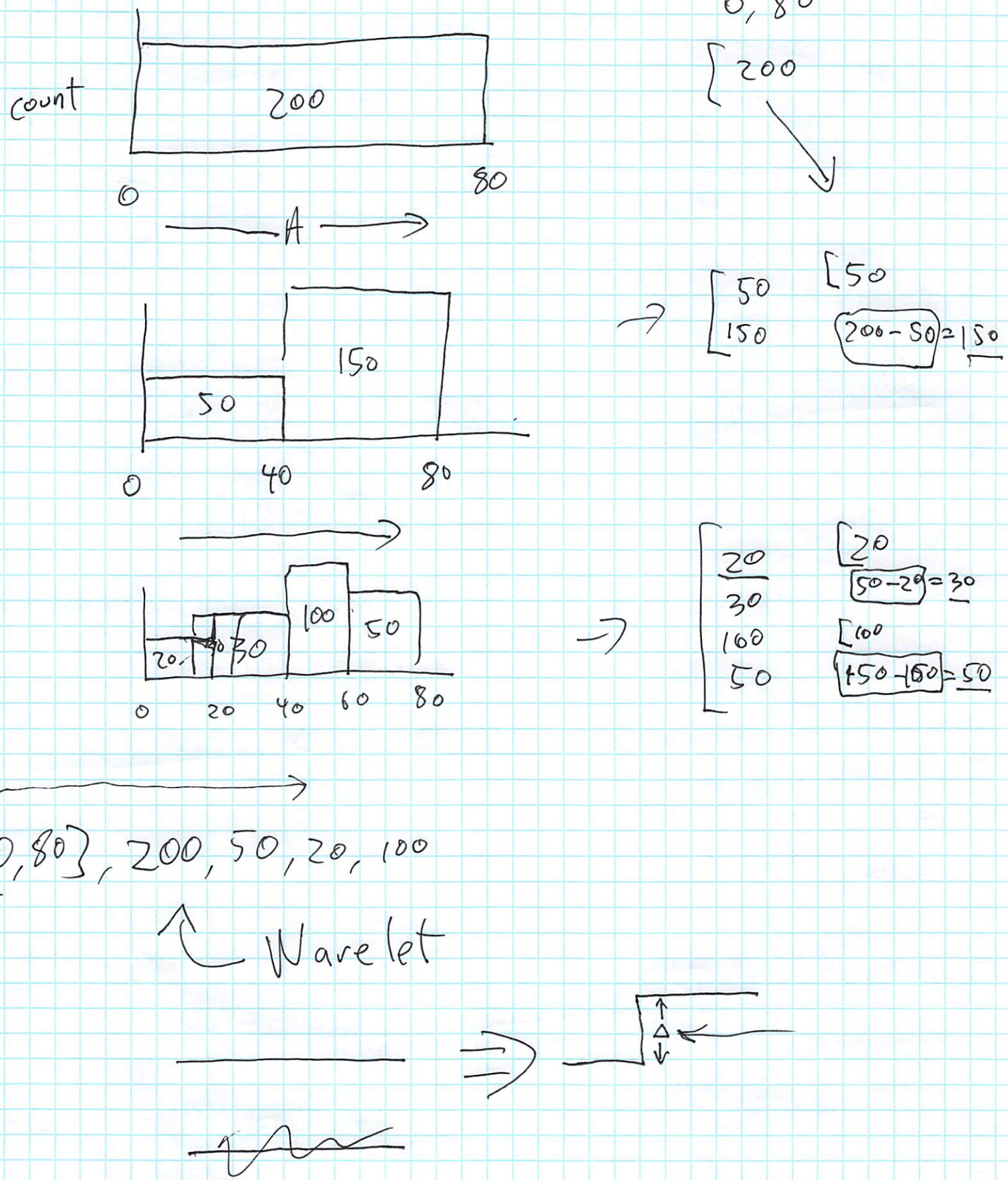




2 buckets

4 buckets

8 buckets


count
200
0
80
A
0, 80
200
50
150
50
150
200-50=150
0
40
80
20
30
100
50
0
20
40
60
80
20
30
100
50
20
50-20=30
100
150-100=50
[0,80], 200, 50, 20, 100
Wavelet

γ_A → $|\gamma_{A,sum...} R| = \#\text{distinct } A$

$\gamma_{B,A}$ → $|\gamma_{B,A} R| = \#\text{distinct } A \cdot \#\text{distinct } B$ or $|R|$ whichever is lower

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Key

R | A B

S | C A

$|S \times R| = |R| \times |S|$

$\sigma_{S.A=R.A}$

$a = R.A$

↳ $\#\text{distinct} = |R|$

$$\text{selectivity} = \frac{1}{|R|}$$

$|S \bowtie R| = |R| \times |S| \cdot \text{selectivity} = |S|$