

California Mathematics Council, Community Colleges

21st Annual Recreational Mathematics Conference

April 21 – April 22, 2017

Lake Tahoe Community College, South Lake Tahoe, CA

“The Battleship Game”

Rick Luttmann, PhD

Professor Emeritus of Mathematics

Sonoma State University

Rose's Payoff Table

Collins's Options

Rose's
Options

	a	b	c	d	e
A	+18	-7	-25	-101	+24
B	+11	-53	-2	-14	+88
C	+11	+15	+33	-1	+8
D	+121	+44	-2	-30	-1

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Collins's Options

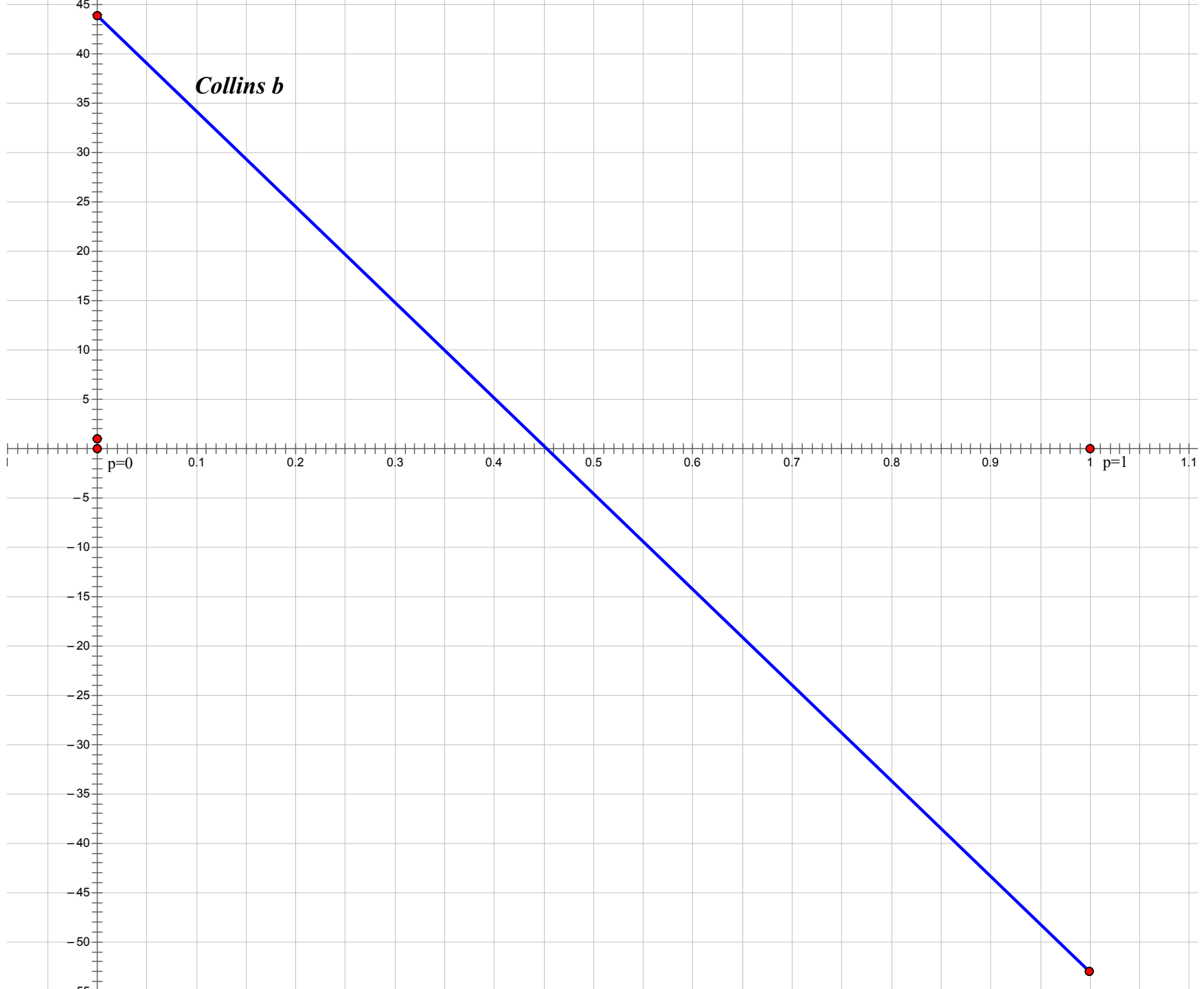
		Probabilities:		q	1-q
				b	d
Rose's Options	p	B	-53	+14	
	1-p	D	+44	-30	

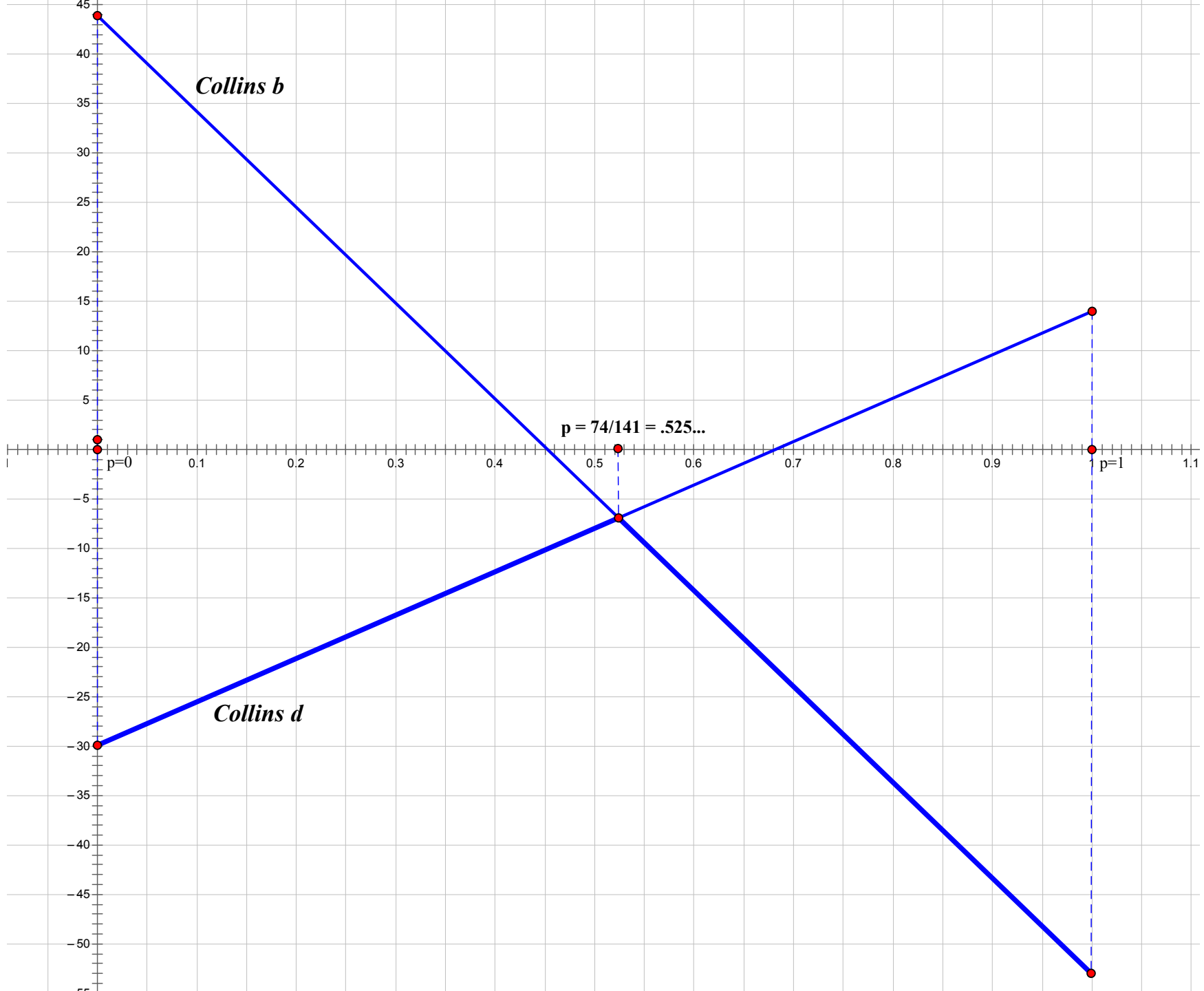
Collins's expected loss from b: $-53 p + 44 (1-p)$

Collins's expected loss from d: $+14 p - 30 (1-p)$

Rose's expected gain from B: $-53 q + 14 (1-q)$

Rose's expected gain from D: $+44 q - 30 (1-q)$





Rose's Payoff Table

Collins's Options

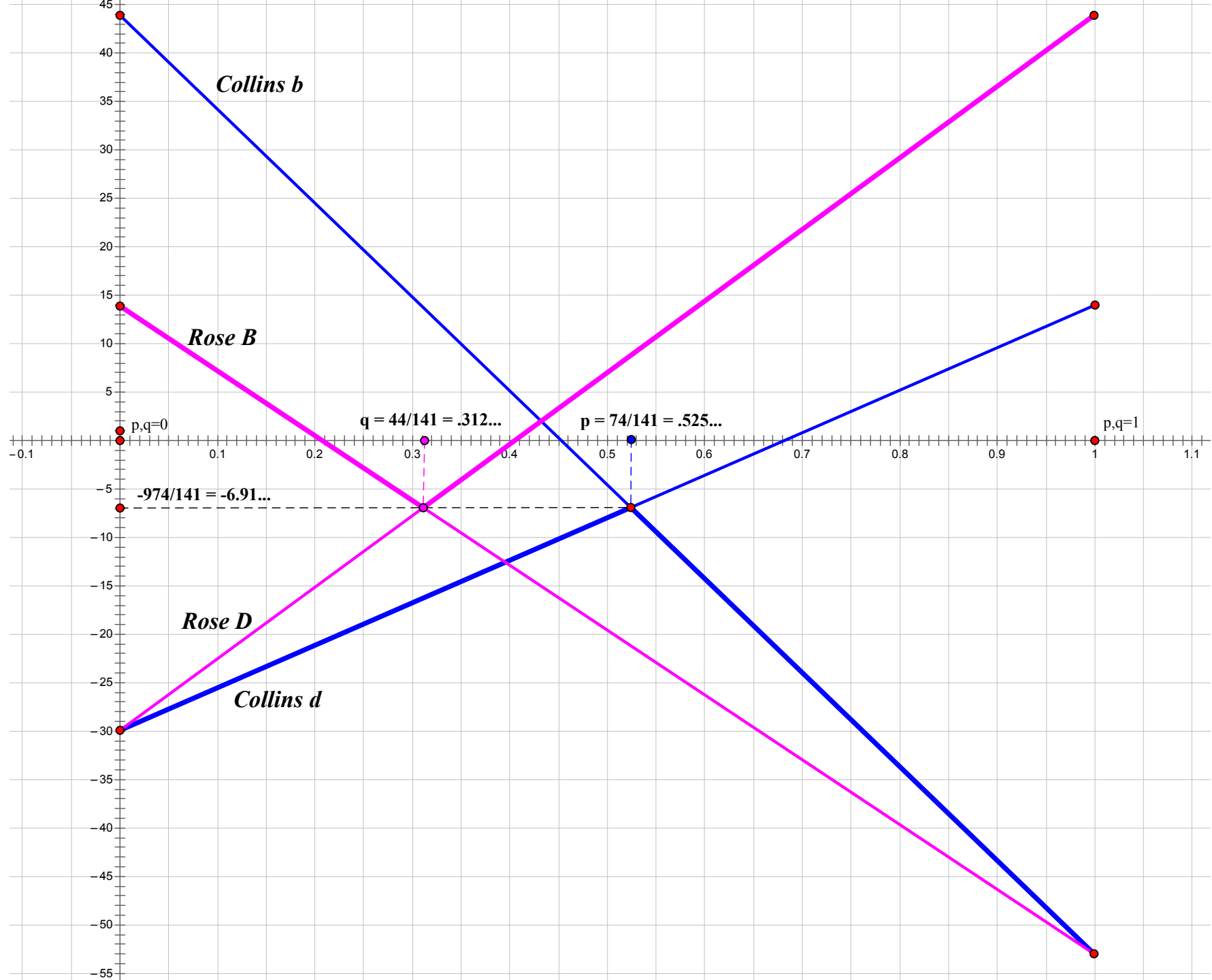
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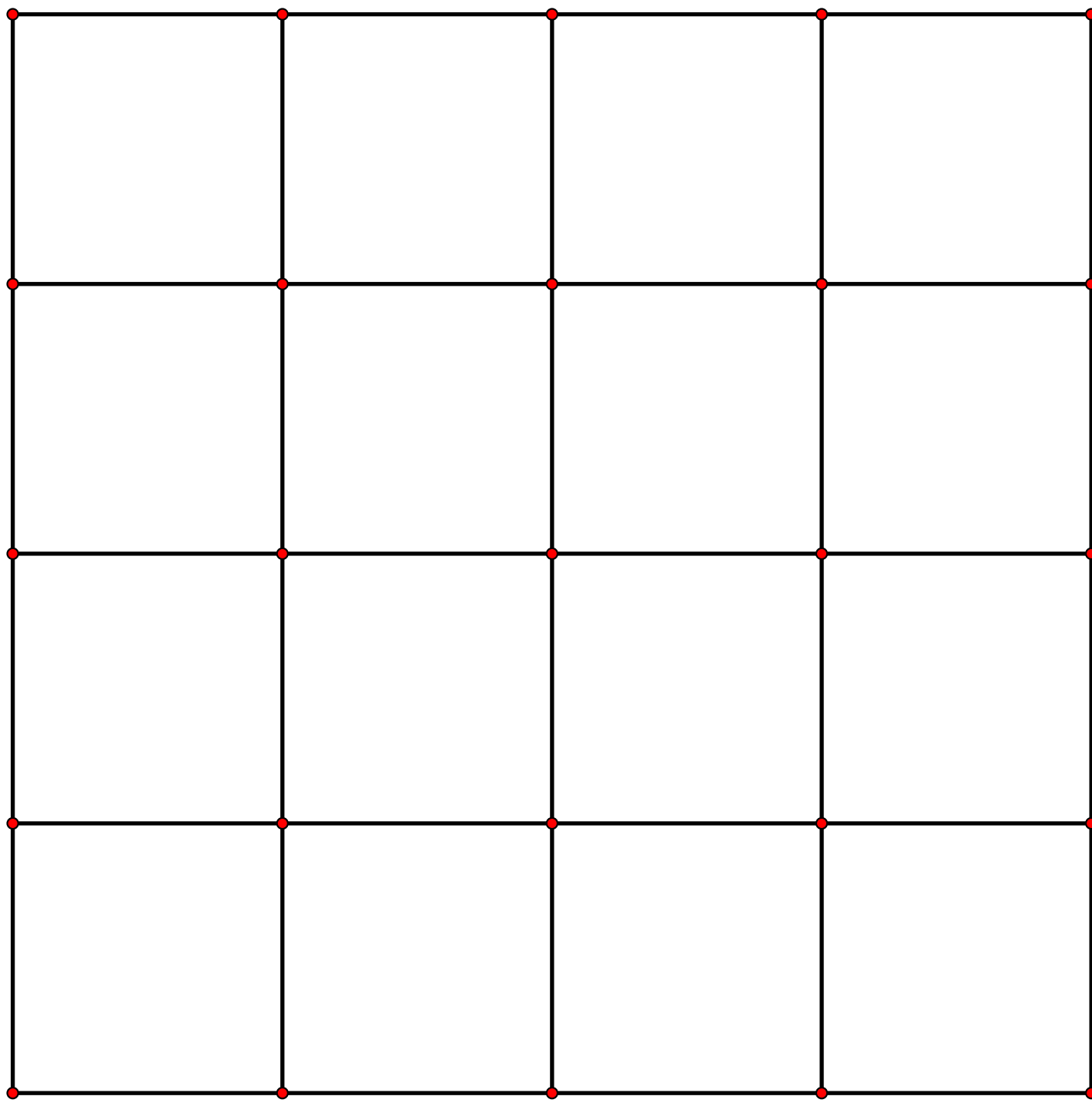
Collins's expected loss from b: $-53 p + 44 (1-p)$

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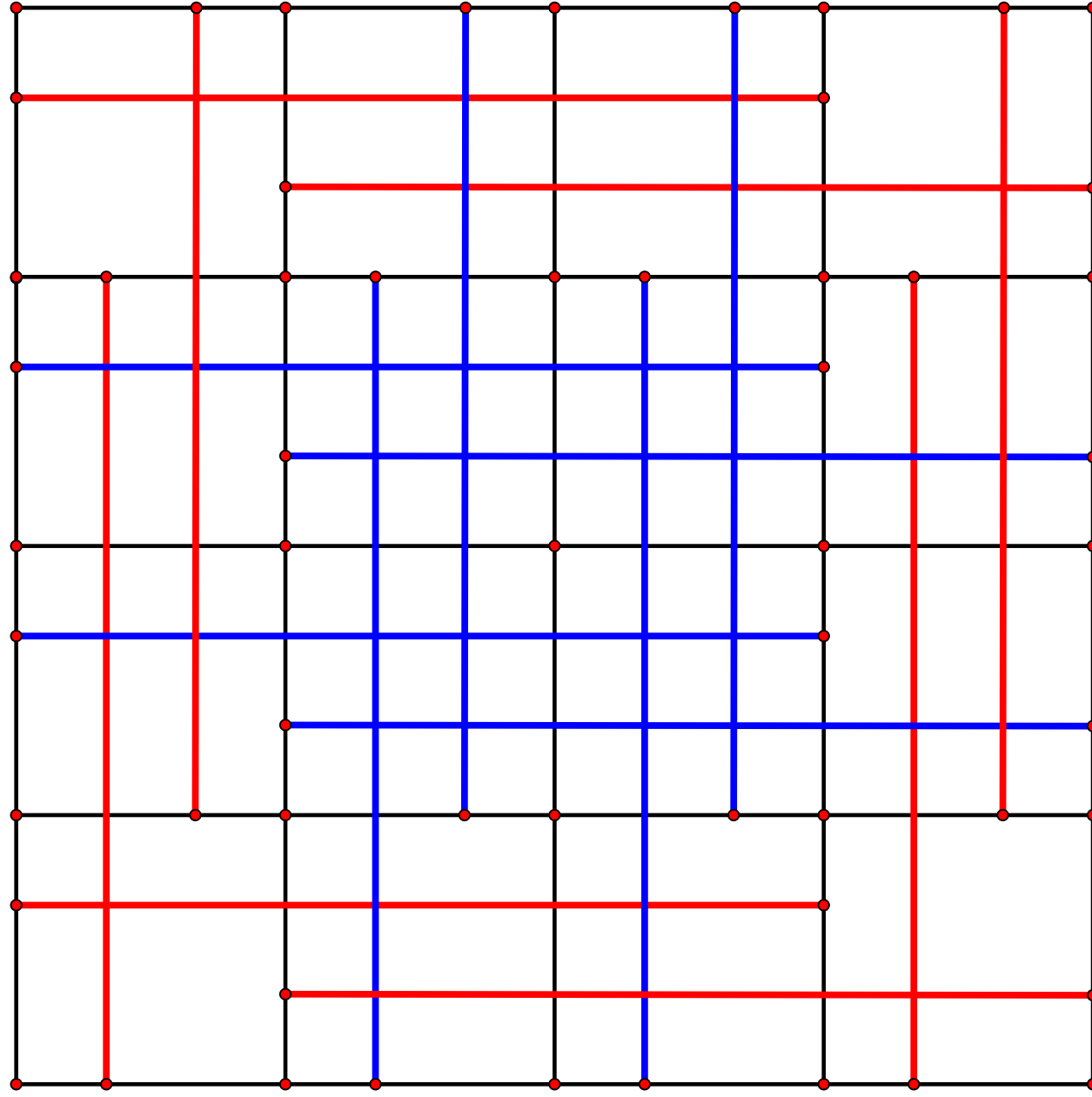
Rose's expected gain from D: $+44 q - 30 (1-q)$





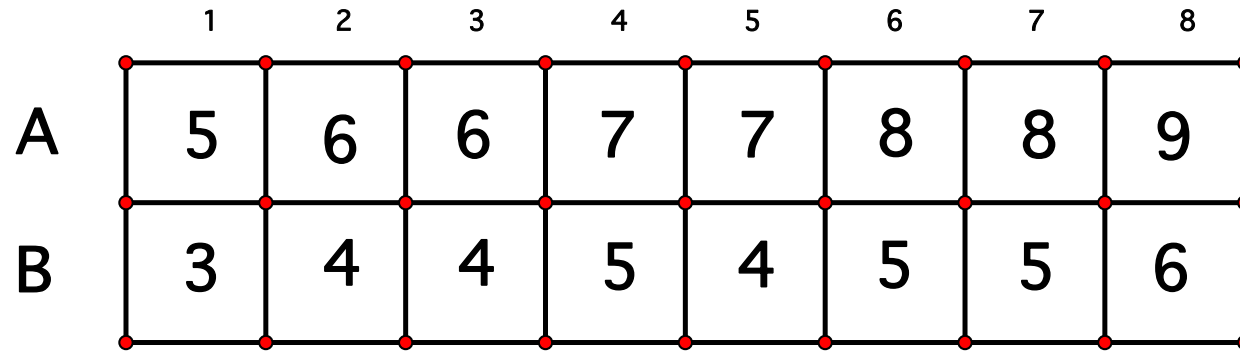
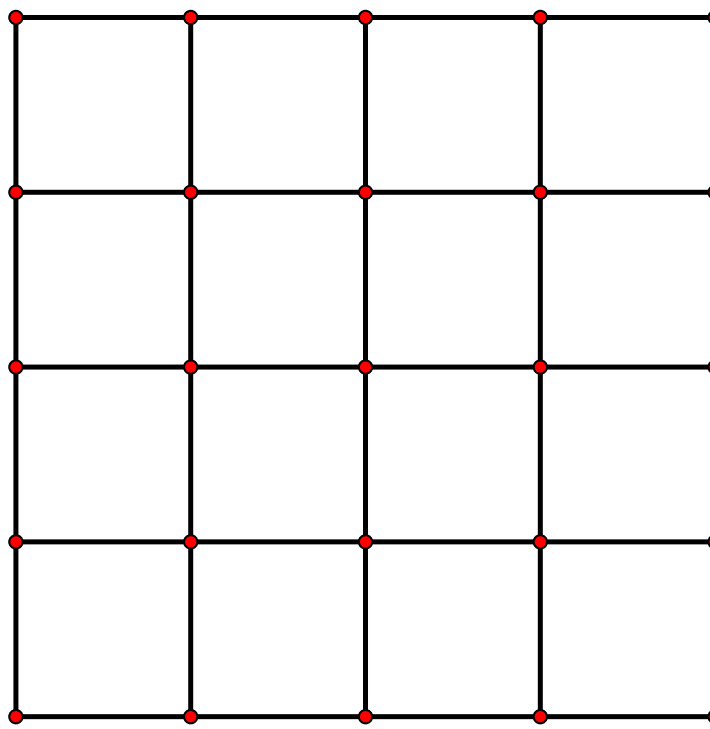
8 "A" positions (red), contain corner cells

8 "B" positions (blue), contain center cells

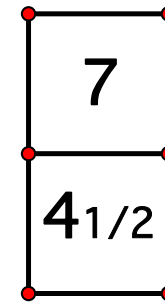


Strategy:

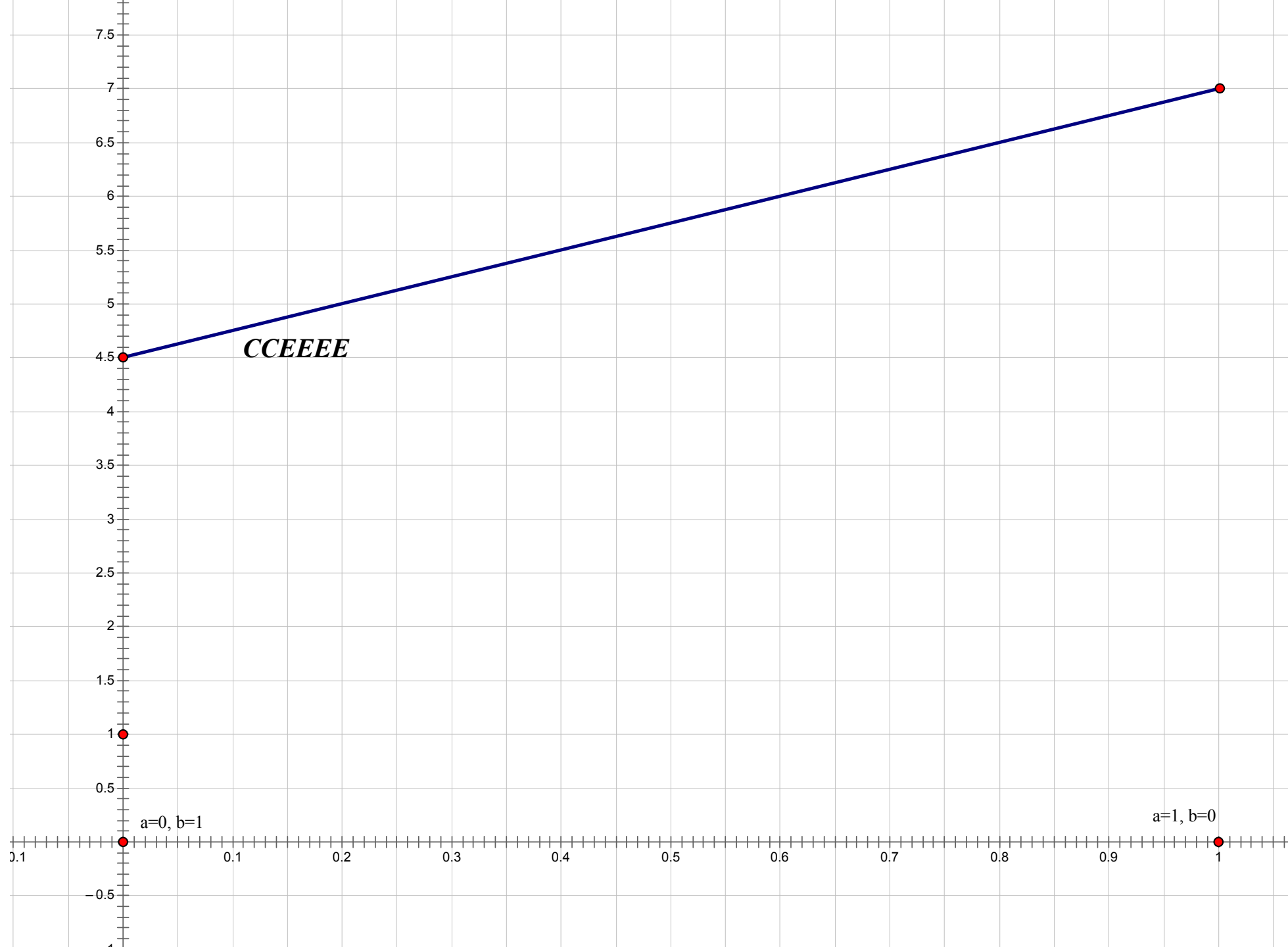
---CCEEEE---



average

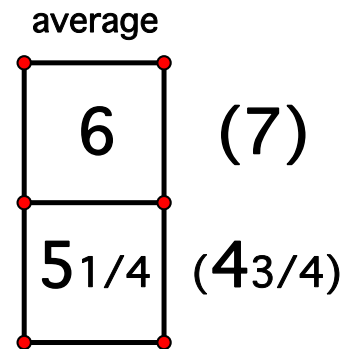
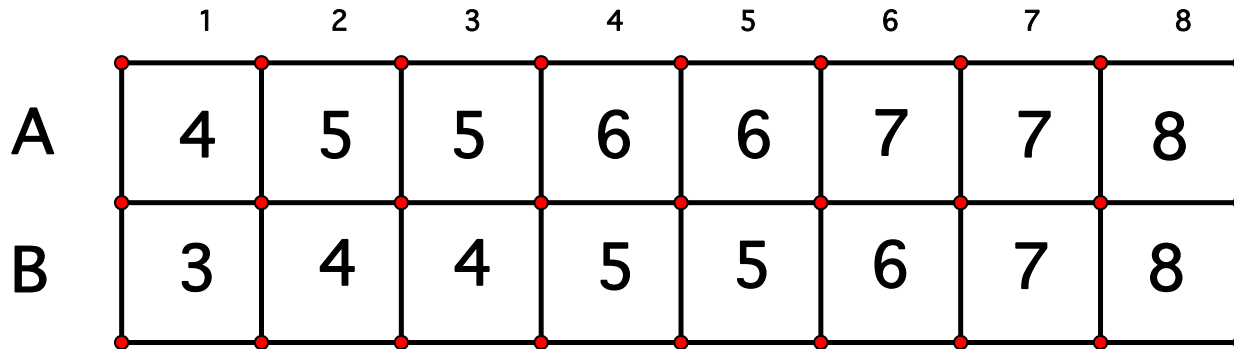
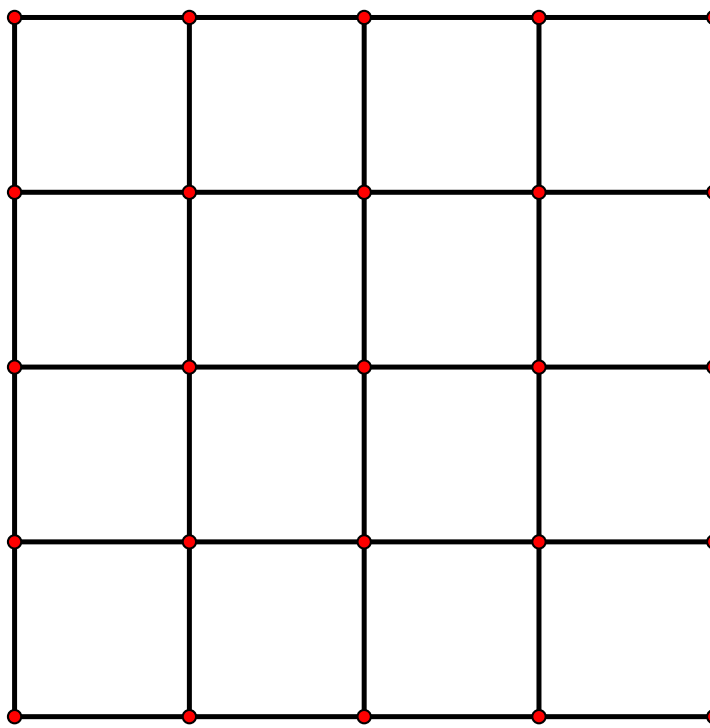


Expected number of strikes: $\frac{7}{1} a + \frac{4\frac{1}{2}}{1} b$

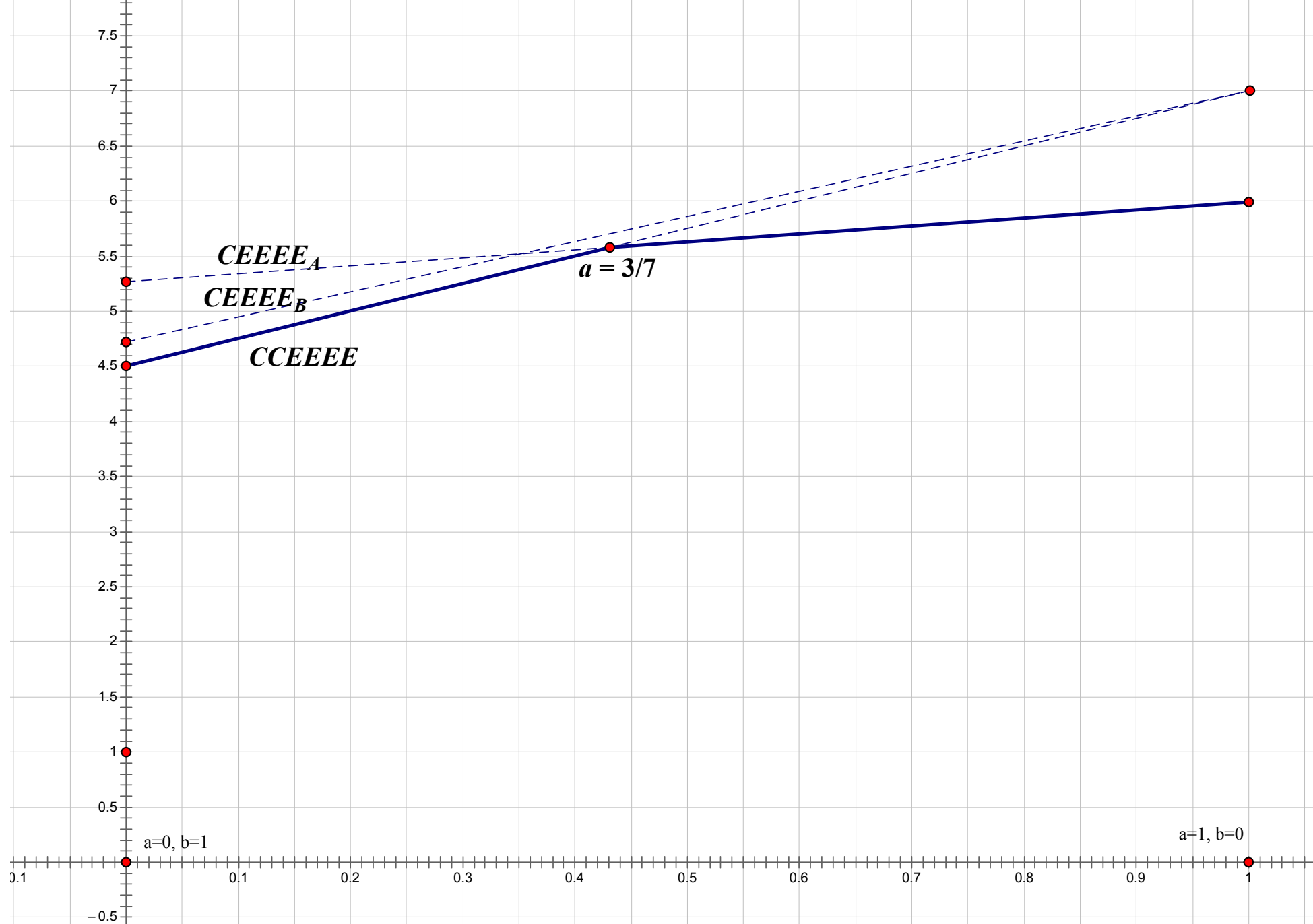


Strategy:

--- C E E E E ---

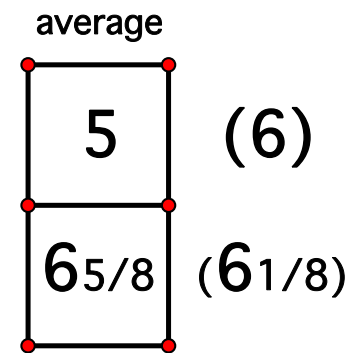
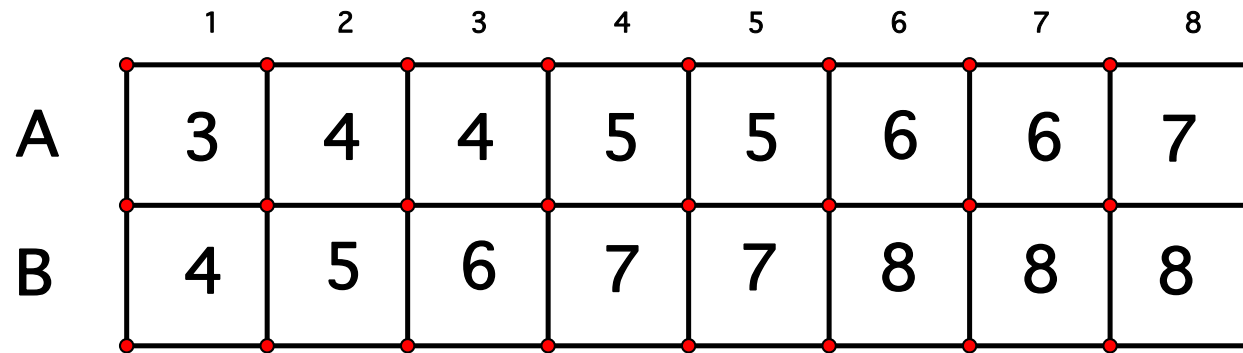
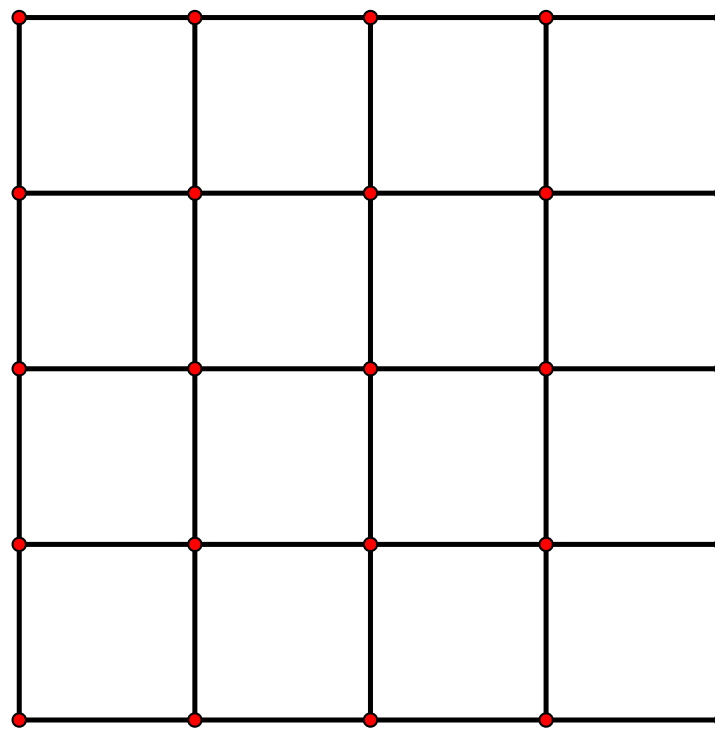


Expected number of strikes: $\frac{6}{1} a + \frac{5\frac{1}{4}}{1} b$

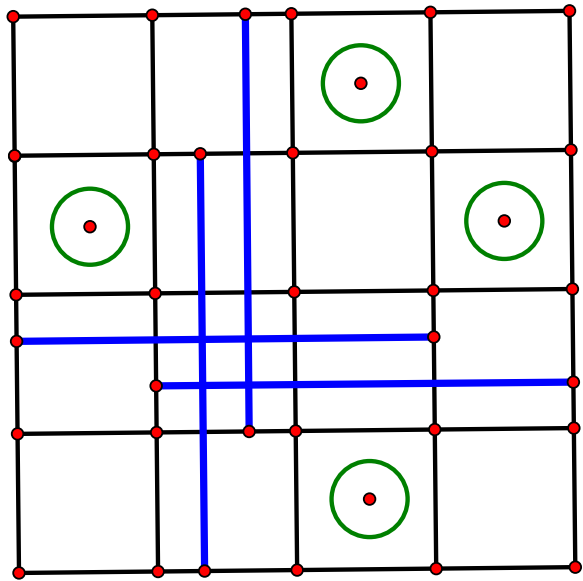


Strategy:

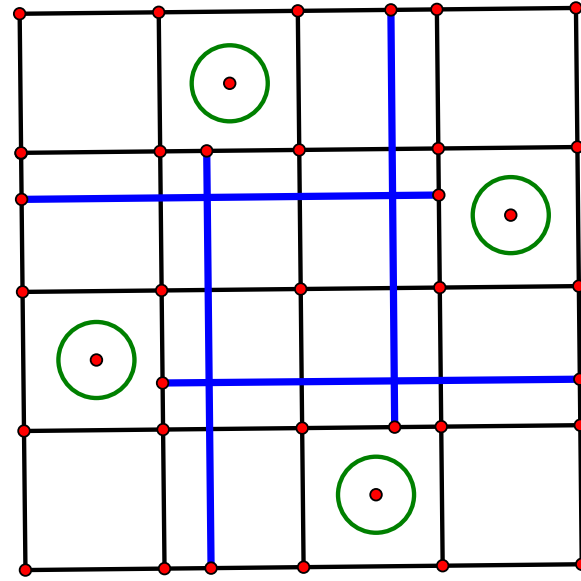
-----EEEEC-----



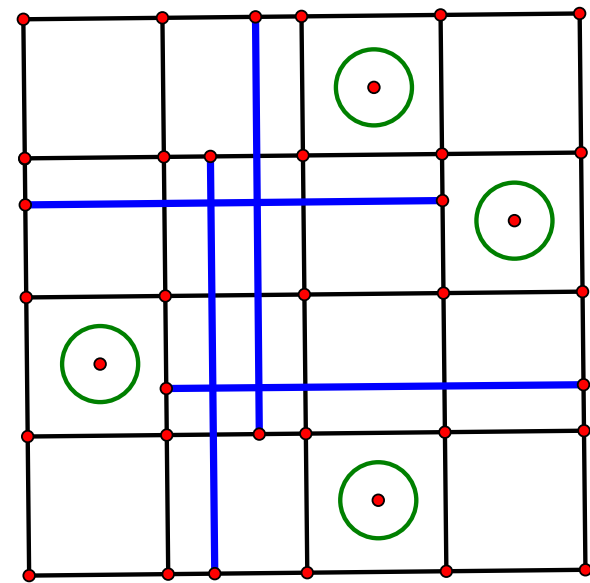
Expected number of strikes: $\frac{5}{1} a + \frac{6\frac{5}{8}}{1} b$



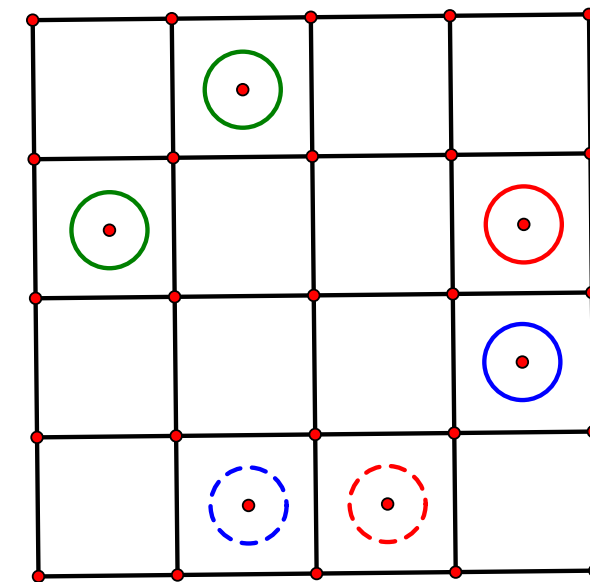
3 - 4 - 4 - 5



3 - 4 - 4 - 5

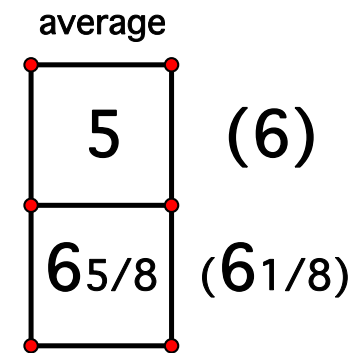
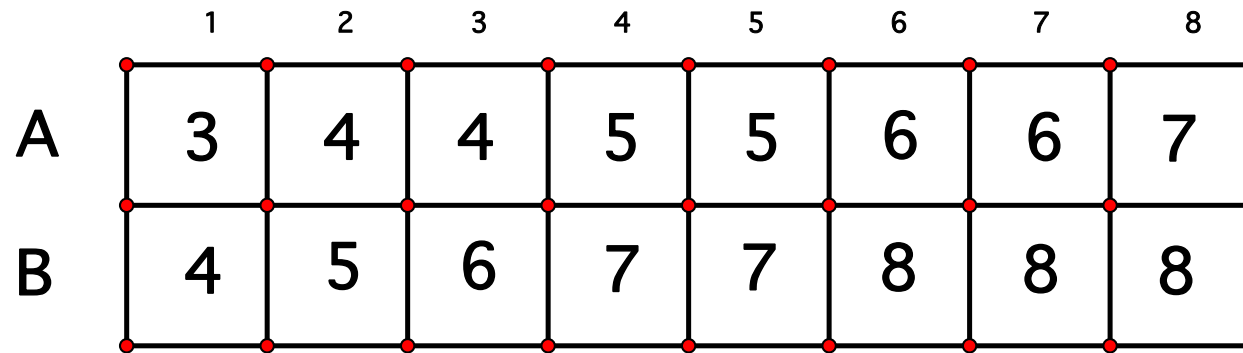
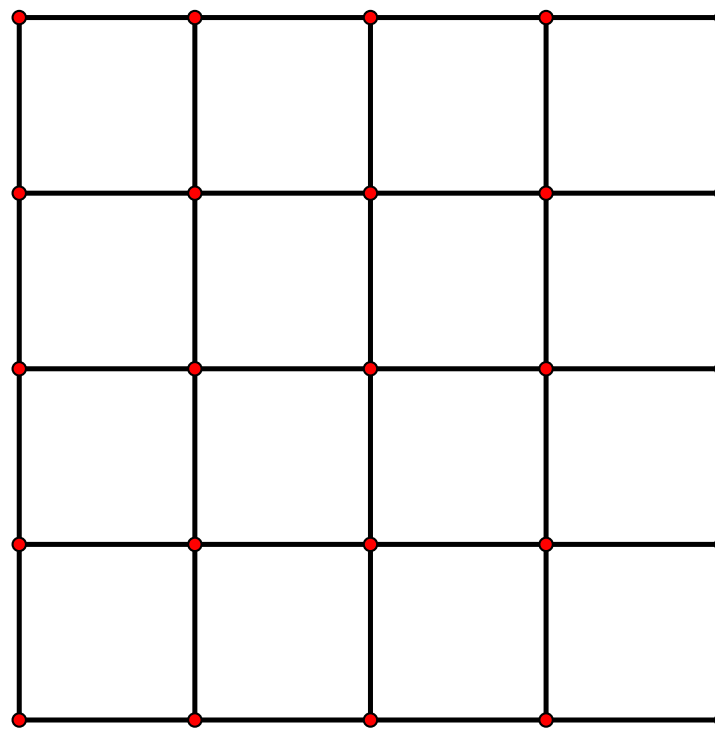


3 - 4 - 4 - 4



Strategy:

-----EEEEC-----



Expected number of strikes: $\frac{5}{1} a + \frac{6\frac{5}{8}}{1} b$

