UW Math Circle
October 17th, 2019

Warmups

Score of numbers

Twenty numbers are drawn from the linear sequence $1, 4, 7, 10, \ldots, 100$. Show that two of these twenty sum to 101.

Word of the Ring

Bilbo has found a ring with a message written around it in a language he doesn't know. For each position around the ring he writes down the sequence of letters starting and ending there. Being neat, he sorts the sequences alphabetically down his page. Unfortunately, Bilbo loses the ring and spills tea on the list such that only the final column is legible.

For example, if the message is "Carrot", Bilbo's sorted list is

Each position	Alphebetized	Final column
Carrot	arrotC	C
arrotC	Carrot	t
rrotCa	otCarr	r
rotCar	rotCar	r
otCarr	rrotCa	a
tCarro	tCarro	o

Bilbo explains exactly what happened to Gandalf and shows him the final column "Ctrrao". Gandalf says "that's ok: assuming the message starts with a capital letter, it was Carrot." How did Gandalf know?

What would Gandalf have said if the final column was "rrMdoo"?