

# Lausn á *Language Survey*

Bergur Snorrason

30. janúar 2023

- ▶ Þér er gefið land sem er skipt í grind eftir hvaða tungumál eru töluð hvar.
- ▶ Þú veist að í heildina eru þrjú tungumál töluð.
- ▶ Þér er einnig sagt, fyrir sérhvern reit, hvort eitt tungumál sé talað þar eða fleiri.
- ▶ Einnig er gefið að hvert tungumál er talað á samanhagandi svæði reita.
- ▶ Með öðrum orðum getur þú labbað milli allra reita sem tala sama tungumál án þess að þurfa að heimsækja reit sem talar ekki tungumálið.
- ▶ Þú átt ákvarða hvar hvert tungumál er talað, ef það er á annað borð hægt.

► Fyrri sýniinntakið er

```
1 3 4
2 2211
3 1112
4 1112
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► og samsvarandi úttak er

```
1 AAAA
2 ...A
3 ....
4
5 BB..
6 BBBB
7 ...B
8
9 ....
10 ...C
11 CCCC
```

- ▶ Gerum ráð fyrir að við getum raðað tungumálunum þannig að eitt tungumál er talað í hverjum reit, en fyrir hvern reit er líka, að minnsta kosti, einn nágranni sem talar annað tungumál.
- ▶ Ef slík skipun er til þá er eftirleikurinn auðveldur.
- ▶ Fyrir hvern reit þar sem fleiri en eitt tungumál er talað veljum við tungumálið sem er talað hjá nágrannanum sem talar annað tungumál og látum það tungumál líka talað í þeim reit.
- ▶ En er slík skipun til?

- ▶ Byrjum á að láta dálkinn lengst til vinstri fá tungumál A.
- ▶ Við látum svo p tákna reitinn efst til hægri og q tákna reitinn neðst til hægri og:
  - ▶ Færum p til vintri þangað til hann kemst ekki lengra og látum alla reiti sem hann lendir á fá tungumál B.
  - ▶ Færum p niður þangað til hann kemst ekki lengra og látum alla reiti sem hann lendir á fá tungumál B.
  - ▶ Færum q upp þangað til hann kemst ekki lengra og látum alla reiti sem hann lendir á fá tungumál C.
  - ▶ Færum q til vinstri þangað til hann kemst ekki lengra og látum alla reiti sem hann lendir á fá tungumál C.
  - ▶ Færum p til hægri þangað til hann kemst ekki lengra og látum alla reiti sem hann lendir á fá tungumál B.
  - ▶ Færum p upp þangað til hann kemst ekki lengra og látum alla reiti sem hann lendir á fá tungumál B.
  - ▶ Færum q niður þangað til hann kemst ekki lengra og látum alla reiti sem hann lendir á fá tungumál C.
  - ▶ Færum q til hægri þangað til hann kemst ekki lengra og látum alla reiti sem hann lendir á fá tungumál C.
  - ▶ Endurtökum þar til allir reitir hafa tungumál.

X X X X X X X X X  
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X X X X X X X X X  
X X X X X X X X X

A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x

A x x x x x x x B  
A x x x x x x x x  
A x x x x x x x x  
A x x x x x x x x  
A x x x x x x x x  
A x x x x x x x x  
A x x x x x x x x  
A x x x x x x x x



A	x	x	x	x	x	x	B	B
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x

A	x	x	x	x	x	B	B	B
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x

A	x	x	x	x	B	B	B	B
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x

A	x	x	x	B	B	B	B	B
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x

A	x	x	B	B	B	B	B	B
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x

A	x	B	B	B	B	B	B	B
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x

A	B	B	B	B	B	B	B	B
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x

A	B	B	B	B	B	B	B	B
A	B	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x



A	B	B	B	B	B	B	B	B
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x

A	B	B	B	B	B	B	B	B
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x

A	B	B	B	B	B	B	B	B
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x

A	B	B	B	B	B	B	B	B
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x

A	B	B	B	B	B	B	B	B
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x
A	x	x	x	x	x	x	x	x

A	B	B	B	B	B	B	B	B
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
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A	B	x	x	x	x	x	x	x
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A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
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A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x

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A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	C



A	B	B	B	B	B	B	B	B
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C

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A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
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A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C

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A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
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A	B	x	x	x	x	x	x	x
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A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	C
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A	B	x	x	x	x	x	x	C

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A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
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A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C

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A	B	x	x	x	x	x	x	x
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C

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A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
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A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C



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A	B	x	x	x	x	C	C	C
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A	B	x	x	x	x	x	x	C
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A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C

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A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
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A	B	x	x	x	x	x	x	C

A	B	B	B	B	B	B	B	B
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A	B	x	x	x	x	x	x	C
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A	B	x	x	x	x	x	x	C

A	B	B	B	B	B	B	B	B
A	B	x	C	C	C	C	C	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	B	x	x	x	x	x	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	B	B	x	x	x	x	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	B	B	B	x	x	x	C



A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	B	B	B	B	x	x	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	B	B	B	B	B	x	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	x	x	x	x	x	x	C
A	B	x	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	B	B	B	B	B	B	C



A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	x	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	x	x	x	x	x	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	C	x	x	x	B	C
A	B	B	B	B	B	B	B	C



A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	C	C	x	x	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	C	C	C	x	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	C	C	C	C	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	x	x	x	B	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	C	C	C	C	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	x	x	B	B	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	C	C	C	C	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	x	B	B	B	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	C	C	C	C	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	B	B	B	B	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	C	C	C	C	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	B	B	B	B	B	C
A	B	C	B	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	C	C	C	C	B	C
A	B	B	B	B	B	B	B	C



A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	B	B	B	B	B	C
A	B	C	B	x	x	x	B	C
A	B	C	B	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	C	C	C	C	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	B	B	B	B	B	C
A	B	C	B	x	x	x	B	C
A	B	C	B	x	x	x	B	C
A	B	C	B	x	x	x	B	C
A	B	C	x	x	x	x	B	C
A	B	C	C	C	C	C	B	C
A	B	B	B	B	B	B	B	C

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A	B	C	C	C	C	C	C	C
A	B	C	B	B	B	B	B	C
A	B	C	B	x	x	x	B	C
A	B	C	B	x	x	x	B	C
A	B	C	B	x	x	x	B	C
A	B	C	B	x	x	x	B	C
A	B	C	C	C	C	C	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	B	B	B	B	B	C
A	B	C	B	x	x	x	B	C
A	B	C	B	x	x	x	B	C
A	B	C	B	x	x	x	B	C
A	B	C	B	x	x	C	B	C
A	B	C	C	C	C	C	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	B	B	B	B	B	C
A	B	C	B	x	x	x	B	C
A	B	C	B	x	x	x	B	C
A	B	C	B	x	x	C	B	C
A	B	C	B	x	x	C	B	C
A	B	C	C	C	C	C	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	B	B	B	B	B	C
A	B	C	B	x	x	x	B	C
A	B	C	B	x	x	C	B	C
A	B	C	B	x	x	C	B	C
A	B	C	B	x	x	C	B	C
A	B	C	C	C	C	C	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	B	B	B	B	B	C
A	B	C	B	x	x	C	B	C
A	B	C	B	x	x	C	B	C
A	B	C	B	x	x	C	B	C
A	B	C	B	x	x	C	B	C
A	B	C	C	C	C	C	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	B	B	B	B	B	C
A	B	C	B	x	C	C	B	C
A	B	C	B	x	x	C	B	C
A	B	C	B	x	x	C	B	C
A	B	C	B	x	x	C	B	C
A	B	C	C	C	C	C	B	C
A	B	B	B	B	B	B	B	C



A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	B	B	B	B	B	C
A	B	C	B	C	C	C	B	C
A	B	C	B	x	x	C	B	C
A	B	C	B	x	x	C	B	C
A	B	C	B	x	x	C	B	C
A	B	C	C	C	C	C	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	B	B	B	B	B	C
A	B	C	B	C	C	C	B	C
A	B	C	B	x	x	C	B	C
A	B	C	B	x	x	C	B	C
A	B	C	B	B	x	C	B	C
A	B	C	C	C	C	C	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	B	B	B	B	B	C
A	B	C	B	C	C	C	B	C
A	B	C	B	x	x	C	B	C
A	B	C	B	x	x	C	B	C
A	B	C	B	B	B	C	B	C
A	B	C	C	C	C	C	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	B	B	B	B	B	C
A	B	C	B	C	C	C	B	C
A	B	C	B	x	x	C	B	C
A	B	C	B	x	B	C	B	C
A	B	C	B	B	B	C	B	C
A	B	C	C	C	C	C	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	B	B	B	B	B	C
A	B	C	B	C	C	C	B	C
A	B	C	B	x	B	C	B	C
A	B	C	B	x	B	C	B	C
A	B	C	B	B	B	C	B	C
A	B	C	C	C	C	C	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	B	B	B	B	B	C
A	B	C	B	C	C	C	B	C
A	B	C	B	C	B	C	B	C
A	B	C	B	x	B	C	B	C
A	B	C	B	B	B	C	B	C
A	B	C	C	C	C	C	B	C
A	B	B	B	B	B	B	B	C

A	B	B	B	B	B	B	B	B
A	B	C	C	C	C	C	C	C
A	B	C	B	B	B	B	B	C
A	B	C	B	C	C	C	B	C
A	B	C	B	C	B	C	B	C
A	B	C	B	C	B	C	B	C
A	B	C	B	B	B	C	B	C
A	B	C	C	C	C	C	B	C
A	B	B	B	B	B	B	B	C

- ▶ Þetta virkar alltaf ef báðar víddirnar eru stærri en tveir.
- ▶ Ef önnur víddin er tveir má nota

A B

A B

A B

A B

A C

- ▶ Ef önnur víddin er einn þarf að leysa dæmið gráðugt.
- ▶ Þetta eru einu tilfellin þar sem maður getur fengið *impossible*.



# Sértilfellið

```
5 int sertilfelli(int* a, int n)
6 {
7     int i, j, b[3][n], c[3] = {0, 0, 0};
8     for (i = 0; i < n; i++) for (j = 0; j < 3; j++) b[j][i] = 0;
9     i = 0;
10    while (i < n && a[i] == 1) b[0][i++] = 1, c[0]++;
11    while (i < n && a[i] == 2) b[0][i] = 1, b[1][i] = 1, i++, c[0]++, c[1]++;
12    while (i < n && a[i] == 1) b[1][i++] = 1, c[1]++;
13    while (i < n && a[i] == 2) b[1][i] = 1, b[2][i] = 1, i++, c[1]++, c[2]++;
14    while (i < n && a[i] == 1) b[2][i++] = 1, c[2]++;
15    if (i < n) return 0;
16    if (c[2] == 0 && c[1] == 0)
17    {
18        if (n == 2) return 0;
19        b[1][0] = b[2][1] = 1;
20        b[0][0] = b[0][1] = 0;
21    }
22    else if (c[2] == 0)
23    {
24        for (i = 0; i < n; i++) if (a[i] == 2) break;
25        b[2][i] = 1;
26    }
27    for (j = 0; j < 3; j++) for (i = 0; i < n; i++)
28        r[j][i] = b[j][i] ? 'A' + j : '.';
29    return 1;
30 }
```

# Köllum á sértilfellið

```
42     if (n == 1 && m == 1)
43     {
44         if (a[0][0] == 1) { printf("impossible\n"); return 0; }
45         printf("A\nB\nC\n");
46         return 0;
47     }
48     if (n == 1)
49     {
50         int g[m];
51         for (i = 0; i < m; i++) g[i] = a[0][i];
52         if (!sertilfelli(g, m)) { printf("impossible\n"); return 0; }
53         for (x = 0; x < 3; x++)
54         {
55             for (i = 0; i < m; i++) printf("%c", r[x][i]);
56             printf("\n\n");
57         }
58         return 0;
59     }
60     if (m == 1)
61     {
62         int g[n];
63         for (i = 0; i < n; i++) g[i] = a[i][0];
64         if (!sertilfelli(g, n)) { printf("impossible\n"); return 0; }
65         for (x = 0; x < 3; x++)
66         {
67             for (i = 0; i < n; i++) printf("%c\n", r[x][i]);
68             printf("\n");
69         }
70         return 0;
71     }
```

## Búum til grunnskiptingin og finnum nágranna með annað tungamál

```
34      int i, j, x, y, z[2], n, m, g[4][2] = {{-1, 0}, {0, -1}, {1, 0}, {0, 1}};

72      for (i = 0; i < n; i++) for (j = 0; j < m; j++) b[i][j] = 1;
73      for (i = 0; i < n; i++) b[i][0] = 2;
74      z[0] = n - 1, z[1] = m - 3, x = n, y = m - 1;
75      for (j = 0; z[j%2] > 0; z[j%2] -= 2, j++) for (i = 0; i < z[j%2]; i++)
76          b[x += g[j%4][0]][y += g[j%4][1]] = 0;

77      for (i = 0; i < n; i++) for (j = 0; j < m; j++) c[i][j] = -1;
78      for (i = 0; i < n; i++) for (j = 0; j < m; j++)
79      {
80          if (i > 0 && b[i - 1][j] != b[i][j]) c[i][j] = b[i - 1][j];
81          if (j > 0 && b[i][j - 1] != b[i][j]) c[i][j] = b[i][j - 1];
82          if (i < n - 1 && b[i + 1][j] != b[i][j]) c[i][j] = b[i + 1][j];
83          if (j < m - 1 && b[i][j + 1] != b[i][j]) c[i][j] = b[i][j + 1];
84      }
```

# Prenta lausn

```
85     for (x = 0; x < 3; x++)
86     {
87         for (i = 0; i < n; i++)
88         {
89             for (j = 0; j < m; j++) printf("%c",
90                 (b[i][j] == x || (a[i][j] == 2 && c[i][j] == x))
91                 ? 'A' + x : '.');
92             printf("\n");
93         }
94         printf("\n");
95     }
96     return 0;
```

