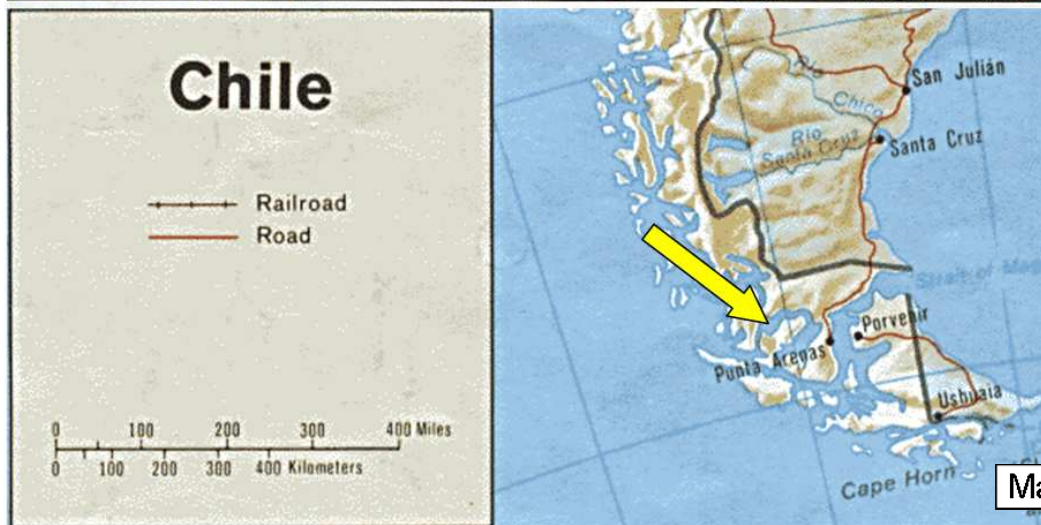


THEOREM OF THE DAY

The Borsuk-Ulam Theorem *Let $f : S^n \rightarrow \mathbb{R}^n$ be a continuous map. There exists a pair of antipodal points on S^n that are mapped by f to the same point in \mathbb{R}^n .*

For $n = 2$, this theorem can be interpreted as asserting that some point on the globe has precisely the same weather as its antipodal point. The ‘weather’ has to mean two variables (\mathbb{R}^2) that vary continuously (f) on the surface of the earth (S^2). Perhaps temperature and humidity

will do? The maps (right) show a pair of antipodal points with, far right, the nearby August weather as given by the **WMO**. As you can see, I have quite failed to match up the weather! Clicking on either map will take you to a nice website where any location is paired with its antipodal point: try if you can do better than me!



Forecasts from <http://worldweather.wmo.int>

Ulan Ude

Weather Forecast

Issued at 12:49 (Local time) 28 Aug 2008

Date	Temperature °C		Weather
	Minimum	Maximum	
29 Aug (Fri)	6	19	FINE DRY
30 Aug (Sat)	4	19	FINE DRY
31 Aug (Sun)	6	23	FINE DRY

Punta Arenas

Weather Forecast

Issued at 18:00 (Local time) 27 Aug 2008

Date	Temperature °C		Weather
	Minimum	Maximum	
28 Aug (Thu)	-4	0	SHOWERS
29 Aug (Fri)	-3	1	SHOWERS
30 Aug (Sat)	-2	2	SHOWERS

Maps from www.lib.utexas.edu/maps

“While chatting at the Scottish Café with Borsuk, an outstanding Warsaw topologist, he [Ulam] saw in a flash the truth of what is now called the Borsuk-Ulam theorem. Borsuk had to commandeer all his technical resources to prove it.”

Web link: www.math.hmc.edu/~su/papers.dir/borsuk.pdf. The Ulam story is from www.emis.de/newsletter/current/current9.pdf.

Further reading: *Basic Topology* by M.A. Armstrong, Springer-Verlag New York Inc, 1997, Chapter 9.

Theorem of the Day is maintained by Robin Whitty at www.theoremoftheday.org

