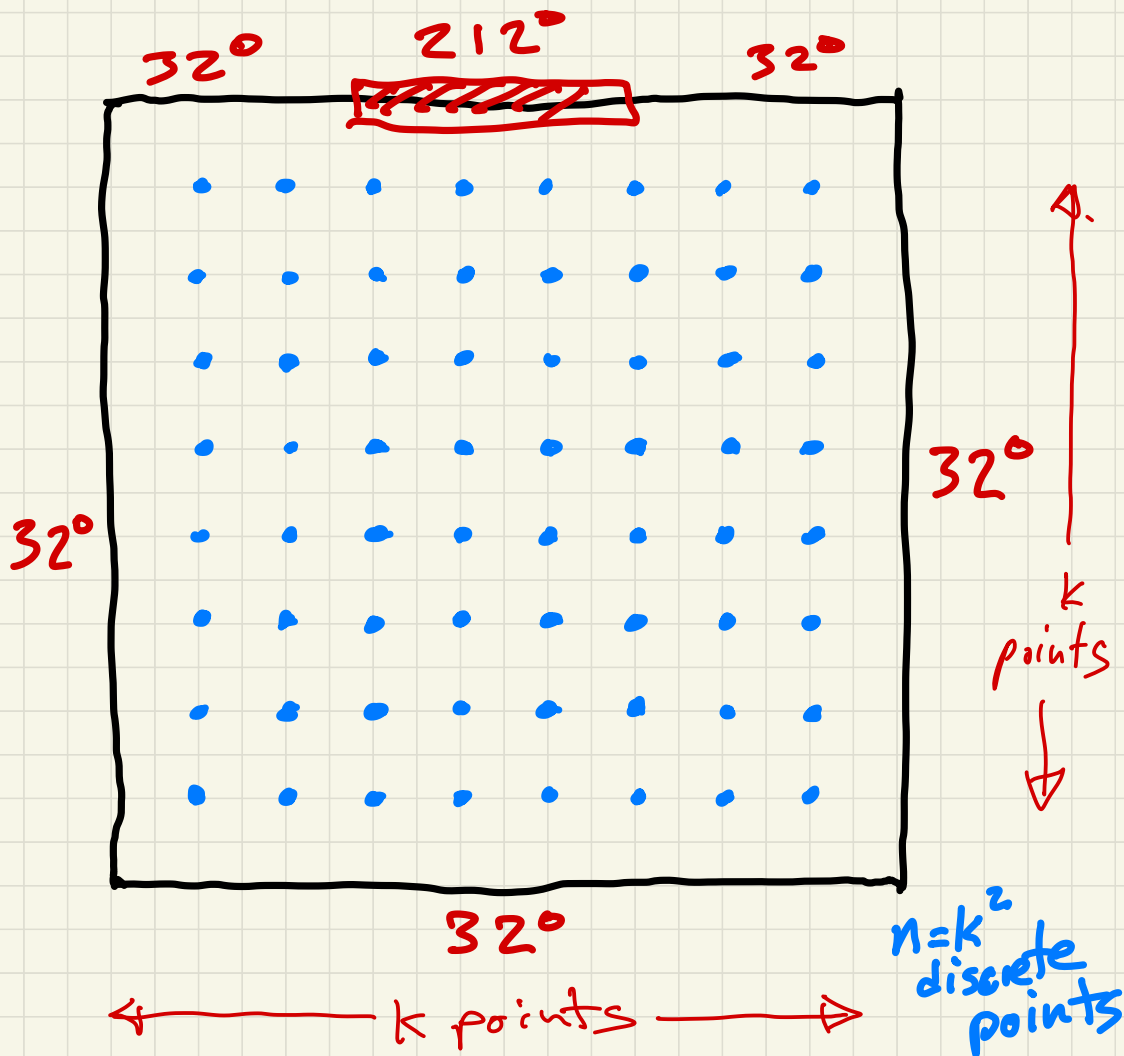


THE TEMPERATURE PROBLEM



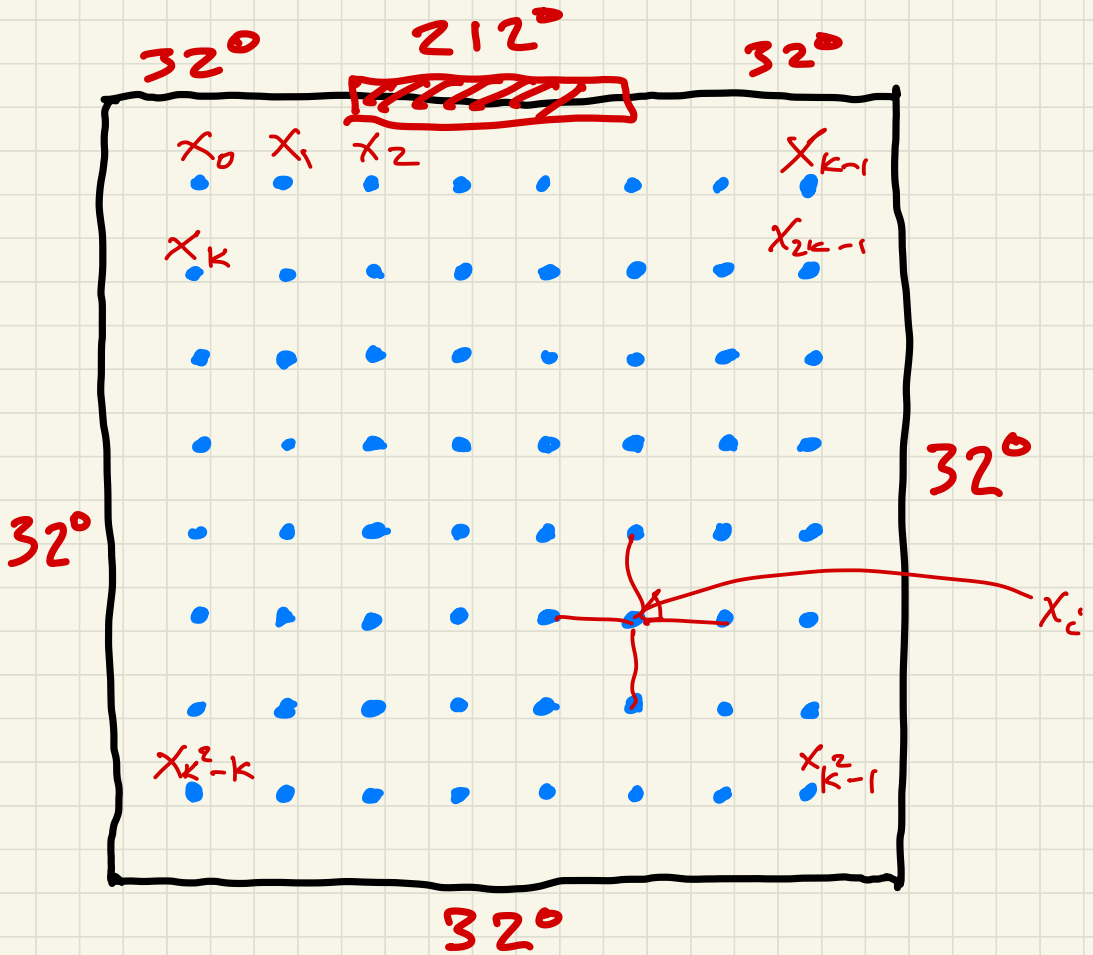
A cabin in the snow, all walls at 32°F except for a radiator at 212°F .

We'll do a 2D cabin because it's easier to draw, but 3D is similar.



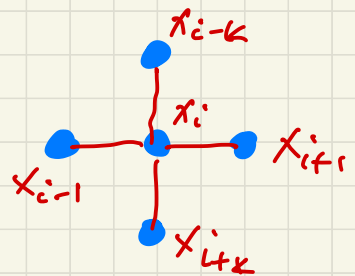
$$k=8$$

$$n=k^2=64$$

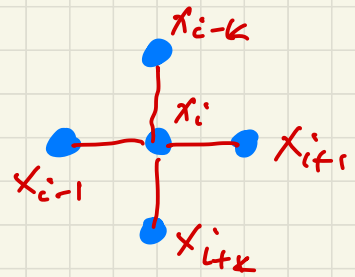


Physics: temp at a point
is the average of temps
at neighboring points.

$$x_i = \frac{1}{4} (x_{i-k} + x_{i-1} + x_{i+1} + x_{i+k})$$



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$$x_i = \frac{1}{4} (x_{i-k} + x_{i-1} + x_{i+1} + x_{i+k})$$

$$-x_{i-k} - x_{i-1} + 4x_i - x_{i+1} - x_{i+k} = 0$$

n equations: $i=0, i=1, \dots, i=k^2-1 = n-1$

n unknowns: x_0, x_1, \dots, x_{n-1}

