

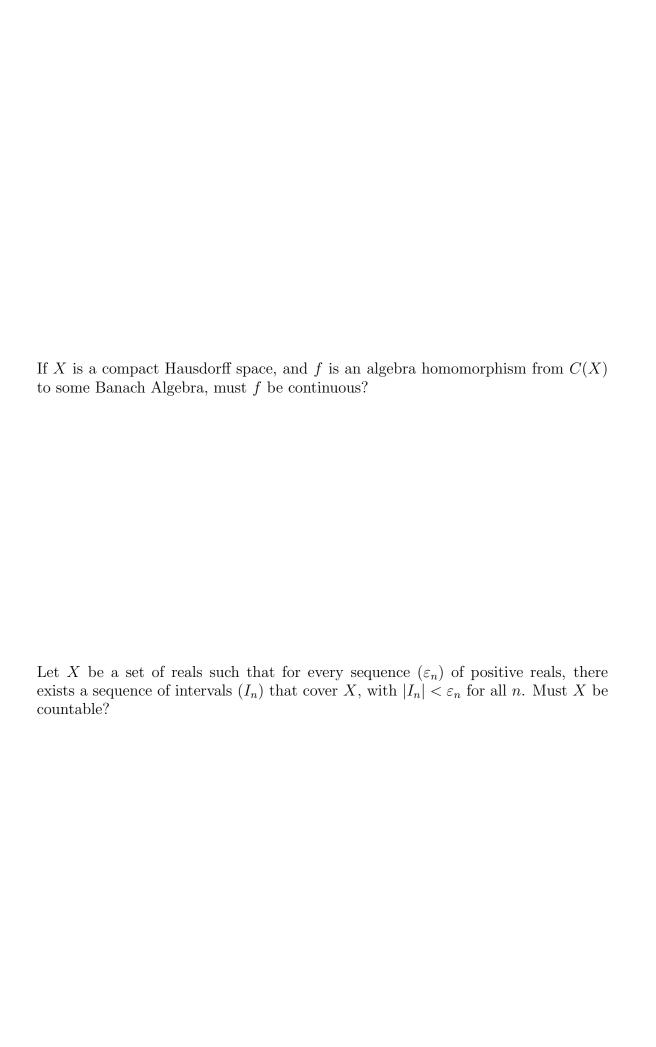
Tired of this problem? https://goo.gl/xDC9Xu

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Tired of this problem? http://goo.gl/iH3XVQ

Tired of this problem? §4 of http://goo.gl/di2YrK



Tired of this problem?
https://goo.gl/gTcFW8

Tired of this problem? https://goo.gl/lzHhtM

(True/False) For every function f mapping [0,1] into the set of countable subsets of [0,1], there exist real numbers x and y such that  $x \notin f(y)$  and  $y \notin f(x)$ .

(True/False) Define a matrix  $A_n$  to be a matrix of 0s and 1s with  $A_n(i,j) = 1$  if j = 1 or i|j, 0 otherwise. For example, here is  $A_8$ :

Then  $\det(A_n) = O(n^{1/2+\epsilon})$  for every  $\epsilon > 0$ .

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https://goo.gl/I2kEDz

Tired of this problem? http://goo.gl/FEvc2a

Is there an  $n \geq 3$  such that

$$|\log\left(\operatorname{lcm}(1,2,\ldots,n)\right) - n| \ge \sqrt{n}\log^2(n)?$$

Here lcm denotes the least common multiple.

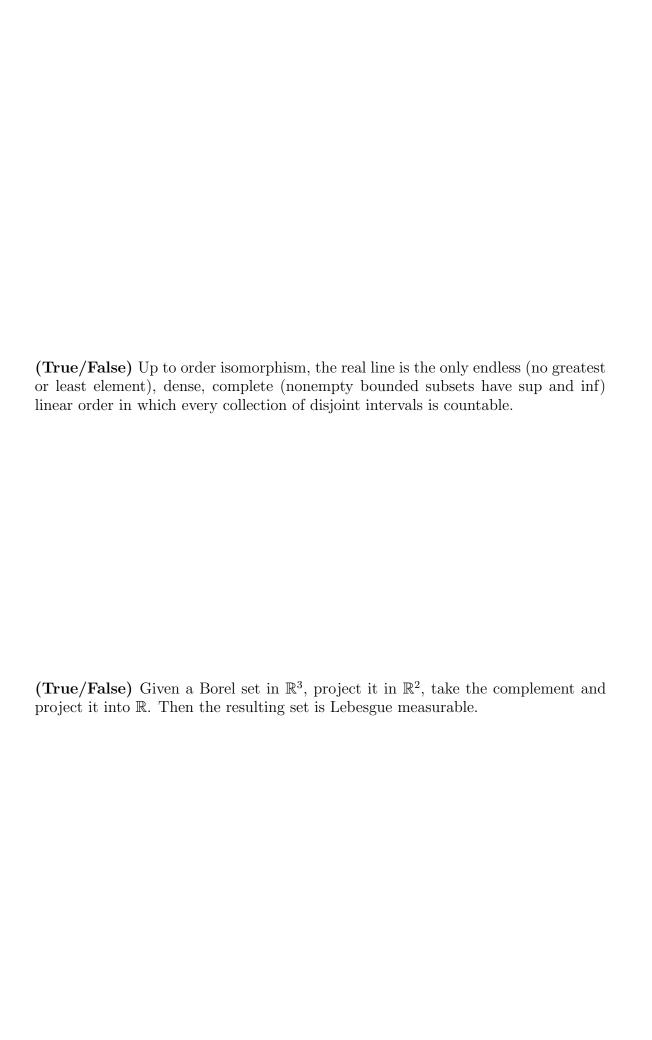
Let  $\mathcal{N}_{(0,1)}$  be the space of functions

$$\mathcal{N}_{(0,1)} = \left\{ \sum_{k=1}^{n} c_k \rho\left(\frac{\theta_k}{x}\right), \ 0 < \theta_k < 1, \sum_{k=1}^{n} c_k = 0, \ n = 1, 2, 3, \dots \right\}$$

where  $\rho(u) = u - \lceil u \rceil$  is a fractional part of u. Is  $\mathcal{N}_{(0,1)}$  dense in  $L^2(0,1)$ ?

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4th comment in http://goo.gl/OsIZrW

Tired of this problem? http://goo.gl/aMlPkr



Tired of this problem?
https://goo.gl/EJCgo1

Tired of this problem? http://goo.gl/OFOuBW

(True/False) Let 
$$H_n = \sum_{j=1}^n \frac{1}{j}$$
. For each  $n \ge 1$ , 
$$\sum_{d|n} d \le H_n + \exp(H_n) \log(H_n),$$

with equality only for n = 1.

(True/False) Let

$$\operatorname{Li}(x) = \int_2^x \frac{dt}{\ln t}$$

and let g(n) denote the maximal order of an element of the symmetric group  $S_n$ . Then for large enough n,

 $\log g(n) < \sqrt{\operatorname{Li}^{-1}(n)}$ 

Tired of this problem? http://goo.gl/f6cUCp

Tired of this problem? http://goo.gl/ggwAz6

(True/False) Let

$$\Phi(u) = 2\sum_{n=1}^{\infty} (2n^4\pi^2 e^{\frac{9}{2}u} - 3n^2\pi e^{\frac{5}{2}u})e^{-n^2\pi e^{2u}}$$

Then

$$\int_{-\infty}^{\infty} \int_{-\infty}^{\infty} \Phi(\alpha) \Phi(\beta) e^{i(\alpha+\beta)x} e^{(\alpha-\beta)y} (\alpha-\beta)^2 d\alpha d\beta \ge 0.$$

Does the integral equation

$$\int_{-\infty}^{\infty} \frac{e^{-\sigma y}\phi(y)dy}{e^{e^{x-y}} + 1} = 0$$

have a bounded solution  $\phi(y)$  other than the trivial solution  $\phi(y)=0$ , for some  $\frac{1}{2}<\sigma<1$ ?

Tired of this problem? http://goo.gl/DhhGT3

Tired of this problem? http://goo.gl/e60NEy