FAI: 20/11/12:

First instruction:
see my website, there will those notes be safed.

www.win.tue.nl/~rvhassel/ !

See link beneath:
Instruction of 2WAFØ....

.xoj files can be opened by: Xournal
there is some windows version of that program.

Now I have put some file there about: functional analysis, maybe of interest to read.

- Questions about theory no problems
- Questions about exercises, the same.

Let hear them!

(google to: z-lib
be careful only 4 dwnlds/day.)

(1.3) (8) What kind of metrics do you have?

$d(x, y) = |x - y|$

$$\underline{\underline{d(x,y)}} \begin{cases} = 1 & x \neq y \\ = 0 & x = y \end{cases}$$

discrete metric

(1.3) (8)

$d(x, x_0) \leq 1 \rightarrow \underline{\underline{X}}$

$B(x_0, 1) = \{x \in X \mid d(x, x_0) < 1\} = \{x_0\}$

$\overline{B(x_0, 1)} = \overline{\{x_0\}} = x_0$

$\tilde{B}(x_0, 1) = \{x \in X \mid d(x, x_0) \leq 1\} = X$

(1.1) (8)

(1.1-7) $\rightarrow$ $C[a, b]$

$$f(t) = \begin{cases} 1 & \text{if } x \in \mathbb{Q} \\ 0 & \text{if } x \in \mathbb{R} \setminus \mathbb{Q} \end{cases}$$

$$\int_a^b |f(t)|\,dt = 0 \qquad \text{but } f(t) \neq 0$$

zero function

only: $f \notin C[a,b]$

(1.3) ℓ^p: $\{x_i\}_{i\in\mathbb{N}}$

$$\sum_{i=1}^{\infty} |x_i|^p < \infty$$

$$\left\{\frac{1}{n}\right\}$$

$y_1 = \{y_{1i}\} \in \ell^p$

$$\left(\sum \frac{1}{n^2} < \infty\right)$$

$\vdots$

$y_n = \{y_{ni}\} \in \ell^p$

$\vdots$

$0 =$

$$\left\{1, \frac{1}{2}, \frac{1}{3}, \ldots\ldots, 0\right\}$$

$\sum_{n=1}^{\infty} \frac{1}{n}$ doesn't converge.

$\sum_{n=1}^{\infty} \frac{1}{n^p} < \infty, \quad p > 1$

Esc 5

$$\left(\frac{1}{n^{1/p}}\right) \qquad \sum \left(\frac{1}{n^{1/p}}\right)^p = \sum \frac{1}{n} < \infty$$

$1 \leq p < \infty$

ex 4 (1.2)

p fixed $\quad \lim_{n \to \infty} \frac{1}{(n^{1/p})} = 0$

$$\left(\exp(\ln(n^{1/p})) = \exp\left(\frac{1}{p}\ln(n)\right) \to \infty\right)$$

$$\left\{\frac{1}{n^{1/p}}\right\}_{n\in\mathbb{N}} = \left(\frac{1}{1}, 2^{-1/p}, 3^{-1/p}, \dots, n^{-1/p}, \dots\right) \longrightarrow 0$$

$(n \to \infty)$

(if p not fixed: (p can depend on n.) $\quad n^{1/n} \to e$ $(n \to \infty)$)

(1.2)(4):

maybe "better" ??

$$x = \left(\frac{1}{\log(n)}\right)$$

$\log(n) \leq n \Rightarrow$
$$\frac{1}{\log(n)} \geq \frac{1}{n}$$

$x \notin \ell^1$

But: ? $\displaystyle\sum_{n=2}^{\infty} \frac{1}{(\log(n))^p}$? $(p>1)$

searching some sequence independent of "p"

$$\int \frac{1}{x\log(x)}\,dx = \log(\log(x))$$

$$\left(\lim_{x \to \infty} \frac{\log(x)}{x^R} \to 0 \quad (R>0)\right)$$

(1.2) (6)

$$A \subset B \Rightarrow \delta(A) \le \delta(B)$$

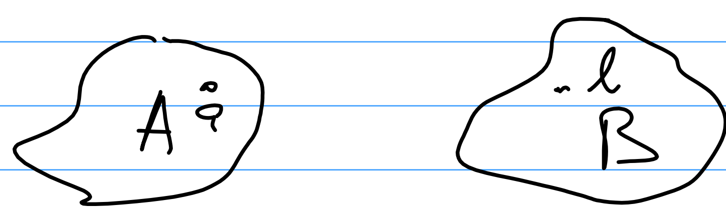
$$\delta(A) = \sup_{(x,y)\in A} d(x,y) \le \sup_{(x,y)\in B} d(x,y) = \delta(B)$$

or just write down:

$$\delta(A) = \sup_{(x,y)\in \underline{A}} (d(x,y)) \le \sup_{(x,y)\in \underline{B\supset A}} d(x,y) = \delta(B)$$

Here you let see, that there is more choice in B than in A for x and y.

<u>(1.2) (12)</u>



$a \in A$, $b \in B$ fixed

$x, y \in A \cup B$

$$d(x,y) \le \underbrace{\delta(A) + \delta(B)}_{< \infty} + d(a,b)$$

so: $(A \cup B)$ is bounded.

(Just to find some bound)

(may much too great, what does us interest, We have a bound)