CHRISTINA:

LET $A \subset \mathbb{R}^n$.

SHOW THAT $Fr(A) = Fr(\mathbb{R}^n - A)$

David Meltzer

Exam problem

- Is path connectedness topologically invariant
- Is measure conserved under diffeomorphism
- Construct covering charts for S^1 and use them to construct one for $S^1 \times S^1$

Dongwei Zhang

Question for midterm of Math 364.

~~Let $C = \{(x,y) \in R^2 : x^2+y^2=1\}$ be the unit~~

Construct an explict homeomorphism between the punctured plane $R^2 \setminus (0,0)$ and the cylinder $\{(x,y,z) \in R^3 : x^2+y^2=1\}$.

MIDTERM RUOXI WANG

Give examples of sets A and B in R^2 which satisfy:

(1). A and B are connected, but $A \cap B$ is not connected.

2) A and B are not connected. but $A-B$ is not connected.

(3) A and B are each not connected, but $A \cup B$ is connected

$X_1 = R^2 \setminus \{0\}$

$X_2 = \{(x,y,z) \in R^3 \mid x^2+y^2=1\}$

$X_3 = \{(x,y,z) \in R^3 \mid x^2+y^2 \leq 1\}$

suppose $n \geq 1$. prove that the polynomial with complex coefficient through order n. $f(z)$: C to C, is an open mapping.

Add. Question:

Suppose $\dim X = 1$, L is a subset of X. L is diffeomorphic to an <u>open</u> interval in $\mathbb{R}^1$.

Prove that $\bar{L} - L$ consists of at most two points:

Paul Tomich
Test Problem

Let X and Y be topological spaces and $f: X \to Y$ is a continuous function.

Show if X is connected, then Y is connected.

Garrett Matzke

Midterm Question

given the discontinuous map find a set in the image whose preimage is not open in the domain

$$g: \mathbb{R}^2 \to \mathbb{R} \qquad g(x,y) = \begin{cases} 0, & [x] = \text{even} \\ 1, & [x] = \text{odd} \end{cases}$$

$[x]$ = integer part of x

4. (The problem for midterm)

(Banach Contraction Principle) Let $\mathfrak{X}$ be a complete metric space. $T: \mathfrak{X} \to \mathfrak{X}$ for some constant $k<1$, $dist(T(x), T(y)) \le k \, dist(x,y)$, $\forall x,y \in \mathfrak{X}$. Thus T has a unique fixed point $\xi \in \mathfrak{X}$. Moreover, for $\forall x_0 \in \mathfrak{X}$, $\lim T(x_i) = \xi$ (Hint: suppose $x_{i+1} = T(x_i)$, first consider $dist(x_0, x_1)$, then consider $dist(x_n, x_m)$. Note that $x_0, x_1, x_2 \cdots \in \mathfrak{X}$ is a Cauchy sequence, that is, $\lim(x_i) = \lim(x_{i+1})$ for $i \to \infty$)