Math 145B
Spring 2015

UPDATED GENERAL INFORMATION — MAY 11, 2015

Study suggestions for the second quiz

As noted in a previous announcement, this will take place in the discussion section on **Thursday, May 14.** A few suggestions are given below. It would also be worthwhile to review previous `update` files for indications of the sorts of questions which might appear and some specific topics worth reviewing (this applies to preparation for both the first quiz and the first examination!).

Much like the first quiz, the second one will consist of a few short answer questions. Possibilities include stating definitions for basic concepts or results (theorems, corollaries, propositions) in the course, true/false questions with an option to give reasons, giving examples to show that two properties of spaces or mappings are not equivalent, multiple choice questions, or explaining how results in the lectures, notes or exercises apply to special cases.

Coverage will include Sections II.1 – II.2 and III.1 – III.3 in the course outline and `notes` files. The corresponding sections of Munkres and Crossley are given in `topics145B.pdf`.

Reviewing the homework problems in `exercises2s15.pdf` and `exercises3s15.pdf`, as well as their solutions in `solutions02s15.pdf` and `solutions03s15.pdf`, is also strongly recommended.

Here are some further questions to consider in preparation for the quiz:

> What is the logical relation between the notions of homotopy equivalence and strong deformation retract? Does the first imply the second, does the second imply the first, does each imply the other, or does neither imply the other? Give examples for any implications that are not valid.
>
> If X is a set, $\mathcal{R}$ is an equivalence relation on X and $\mathbf{T}^*$ is a topology on the set of equivalence classes $X/\mathcal{R}$, find a topology $\mathbf{T}$ on X such that the equivalence class projection $(X, \mathbf{T}) \to (X/\mathcal{R}, \mathbf{T}^*)$ is continuous.
>
> (T/F and why) If P is a one point space and X is a nonempty space, then the set of homotopy classes $[P, X]$ consists of a single point.
>
> (T/F and why) If $f : X \to Y$ is a homotopy equivalence, then f has a unique homotopy inverse $g : Y \to X$.
>
> Suppose that $(X, \mathbf{T})$ is a topological space and $\mathcal{R}$ is an equivalence relation such that the quotient topology on $X/\mathcal{R}$ is indiscrete. Does it follow that $\mathbf{T}$ is the indiscrete topology? Prove this or give a counterexample. [*Hint:* Look back at previous `update` files.]
>
> Suppose that the metric spaces X and Y are subspaces of a third metric space W. Does the disjoint union space $X \amalg Y$ come from a metric space? Prove this or give a counterexample. [*Hint:* By definition, the disjoint union is contained in $W \times \{1, 2\}$ and this product is metrizable. Prove this assertion and use it to prove the metrizability of $X \amalg Y$.]