MATH G4307 PROBLEM SET 1
DUE SEPTEMBER 13, 2011.

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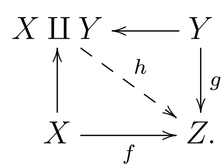
Exercises to turn in:

(E1) Hatcher Exercise 0.6 (p. 18).
(E2) Hatcher Exercise 0.10 (p. 19).
(E3) Hatcher Exercise 0.11 (p. 19).
(E4) Hatcher Exercise 0.16 (p. 19).
(E5) Hatcher Exercise 0.20 (p. 19).
(E6) Recall that the *disjoint union topology* has the following property: given spaces X, Y, Z and continuous maps $f: X \to Z$, $g: Y \to Z$ there is a unique continuous map $h: X \amalg Y \to Z$ so that the following diagram commutes:



Here, the maps $X \to X \amalg Y$ and $Y \to X \amalg Y$ are the canonical inclusions. Moreover, this property characterizes the disjoint union topology. (If you are not familiar with this property, prove it.)

What operation has the analogous property for *based spaces*? (Hint: we saw it in class.) Formulate the property precisely and prove your answer satisfies it.

Problems to think about but not turn in:

(P1) With Exercise (E6) in mind, what are analogues $X \vee Y$ for other classes of mathematical objects (e.g., sets, groups, abelian groups, rings)? Are there (well-known) classes of objects for which $\wedge$ does not exist?
(P2) Read through the remaining problems in Chapter 0, and do any that seem difficult or surprising.
(P3) Remember that you are expected to read the material we will cover in class *before class*. For next week, this is the first section of Chapter 1 (up to the first set of exercises).

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