Turn in starred problems (and only those) on Wednesday 10/22/2008.

Multiple-page homework must be STAPLED when handed in.

Our text has a wealth of interesting problems on metric spaces, so I have listed more problems than usual which you are not asked to turn in. As with all such problems (unless I comment otherwise, as in 20.9 and 20.10 below), I urge you to look at them and think for a while about each; see if you can see what point the problem is making and sketch the idea for a solution in your head or on scrap paper.

On the other hand, I think that 20.8, our last fling with $\mathbb{R}^\omega$, may be very challenging, so I have made one part of it extra credit.

Section 20

- 3*, 4, 5*
- 6; this problem makes the same point that I made in class, about the nature of the neighborhoods for the uniform topology, so I hope you won't have to spend much time on it.
- 7, 8(a)*, 8(b)*; extra credit 8(c). Note that we already know that on $\mathbb{R}^\omega$

  $$\mathcal{T}_{\text{box}} \supset \mathcal{T}_{\text{unif}} \supset \mathcal{T}_{\text{prod}}$$

  so that 8(a) just fits $\mathcal{T}_{\ell^2}$ into this hierarchy (on X); note also that these inclusions automatically apply to the corresponding subspaces topologies on subspaces.
- 9, 10; this material is very important for analysis, but I don't think that we will need it in this course, so spend time on these two only if you are particularly interested. Most of you seem to be familiar with the material of 9; 10 is an important generalization.

Section 21

- 2; I don't believe that I ever defined what it means for a map to be an *imbedding*, but you can read about it on the bottom of page 105.
- 6, 7*, 8, 9