corrected Assignment #5

Due Friday, 28 February 2020, at the start of class

At this point you should have read all of Chapter 8 of the textbook, and be comfortable with this material. Please read Chapter 9; it contains continuing details on the $\ell^p$ and $L^p$ spaces which we have already been treating as examples.

One exercise below is identified with your initials. Please \LaTeX{} this problem and send both the .tex and .pdf to me at elbueler@alaska.edu by the due date.

**DO THE FOLLOWING EXERCISES** from the textbook (Muscat, *Functional Analysis*, 2014):

- #5 in Exercises 8.14, pages 129–130.  
  Note “well-posed” is defined on page 128. You should assume that $T$ is an operator, i.e. $T \in B(X,Y)$ for normed vector spaces, and that $y \neq 0$ and $y + \delta y \neq 0$.

- #1 in Exercises 8.21, page 134.

- #3 in Exercises 9.4, page 143.  
  You are showing that $\ell^\infty$ is a commutative Banach algebra; see the definition on the first page of Chapter 13.

- #4 in Exercises 9.4, page 143.  
  The word “embed” is defined on page 128. Note $B(\ell^1)$ is a noncommutative Banach algebra.

- #7 in Exercises 9.4, page 143.  
  Start by recalling the definition of $d(x, M)$, namely when $x \in X$, $M \subset X$ is a subspace, and $X$ is a normed vector space.

- #3 in Exercises 9.7, page 146.  
  The convolution product is defined in the previous exercise.


- #2 in Exercises 9.15, page 153.  
  Hint: Make sure $x \cdot y$ is a sum of positive terms and make sure $x \in \ell^p$.

- #3 in Exercises 9.15, page 153.  
  Prove only the first inequality. (The second one is too obscure.)

- #1 in Exercises 9.23, page 164.