Problem set 3

Do for Monday, January 29. (To be handed in at section, or before.)

Rudin, p. 43: #5, #9(d,e,f), #10, #14

Also:
1. If $E_1$ and $E_2$ are subsets of a metric space $X$ such that $E_1 \subset E_2$ and $E_1$ is dense in $X$, show that $E_2$ is dense in $X$.
   Hint: It’s easy!

2. For $\mathbb{R}^2$, consider the following two different metrics. Let $d$ be the usual distance in the plane, and let $\rho$ be the metric given by
   $$\rho((x_1, y_1), (x_2, y_2)) = \max\{|x_1 - x_2|, |y_1 - y_2|\}.$$  
   Show that a subset of $\mathbb{R}^2$ is open with respect to one metric if and only if it is open with respect to the other.