

Math 142  
Homework 1 – Due January 30, 2018  
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1. Do the following problems from Armstrong:
  - Page 22 #10; page 24 #17 (here,  $C$  is the unit circle in the complex plane)
  - Page 31 #1acd, #3 (see definitions on page 30)
  - Page 35 #13; page 36 #21
2. Let  $X = \{1, 2, 3, 4, 5, 6\}$ . List all the open sets in the smallest topology on  $X$  that includes the open sets  $\{1\}$ ,  $\{1, 2\}$ , and  $\{2, 3, 5\}$ . List all of the closed sets.
3. A topological space  $X$  is called *Hausdorff* if it satisfies the following property: for any two distinct points  $x$  and  $y$  in  $X$ , there exist neighbourhoods  $U_x$  and  $U_y$  of  $x$  and  $y$  respectively such that  $U_x \cap U_y = \emptyset$ .
  - (a) Is the topology in Question 2 Hausdorff?
  - (b) Show that any metric space  $(X, d)$  is Hausdorff.