

**CECS 451**  
**Assignment 13**  
**Total: 12 Points**

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General Instruction

- Submit uncompressed file(s) in the Dropbox folder via BeachBoard (Not email or in class).
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1. Consider the following data set comprised of three binary input attributes ( $A_1$ ,  $A_2$ , and  $A_3$ ) and one binary output:
  - (a) (2 points) Compute  $Gain(A_1)$ .
  - (b) (2 points) Compute  $Gain(A_2)$ .
  - (c) (2 points) Compute  $Gain(A_3)$ .

Example	$A_1$	$A_2$	$A_3$	Output $y$
$\mathbf{x}_1$	1	0	0	0
$\mathbf{x}_2$	1	0	1	0
$\mathbf{x}_3$	0	1	0	0
$\mathbf{x}_4$	1	1	1	1
$\mathbf{x}_5$	1	1	0	1

Figure 1: Example data set

2. (6 points) Consider the XOR function of three binary input attributes ( $A_1$ ,  $A_2$ , and  $A_3$ ), which produces the value 1 if and only if an odd number of the three input attributes has value 1. Draw a minimal-sized decision tree for the three-input XOR function.