

Due: Monday 11/26/2018 at 11:59pm (submit via Gradescope).

Leave self assessment boxes blank for this due date.

Self assessment due: Monday 12/3/2018 at 11:59pm (submit via Gradescope)

For the self assessment, **fill in the self assessment boxes in your original submission** (you can download a PDF copy of your submission from Gradescope – be sure to delete any extra title pages that Gradescope attaches). For each subpart where your original answer was correct, write “correct.” Otherwise, write and explain the correct answer. **Do not leave any boxes empty.**

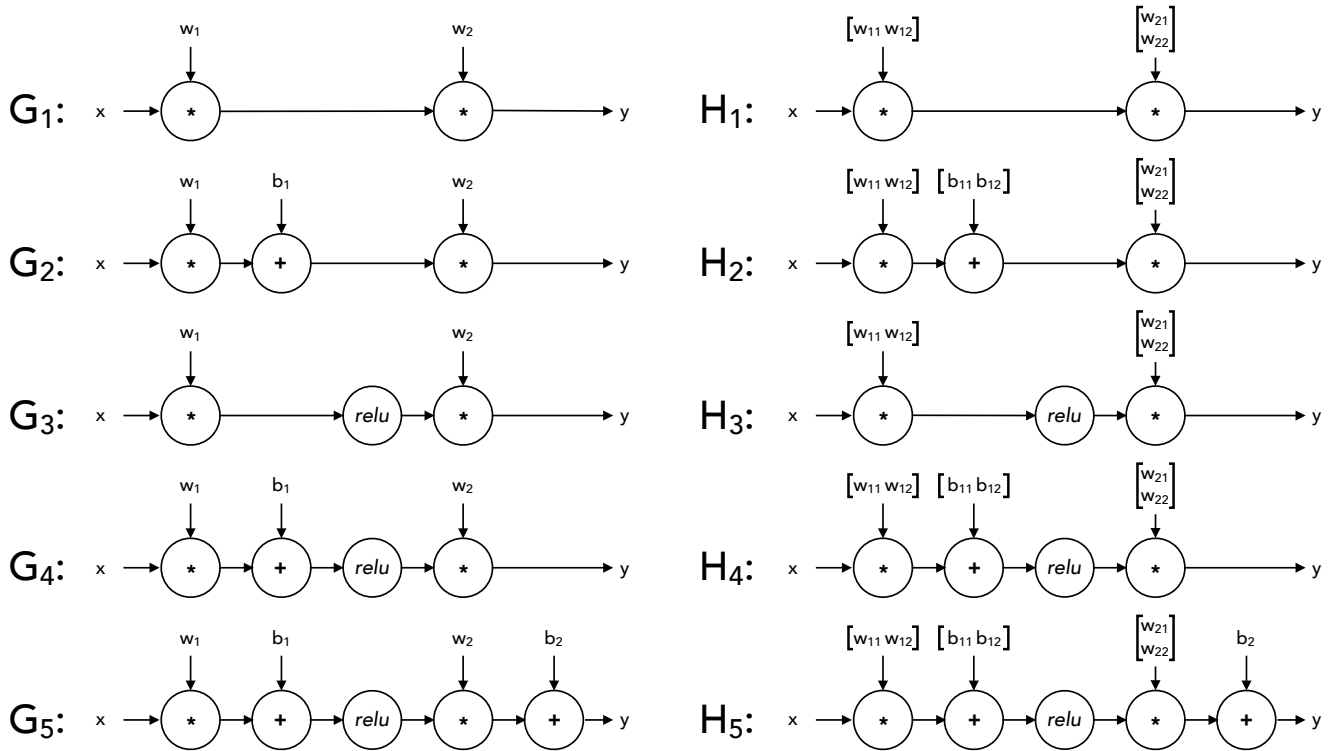
If you did not submit the homework (or skipped some questions) but wish to receive credit for the self-assessment, we ask that you first complete the homework without looking at the solutions, and then perform the self assessment afterwards.

Policy: Can be solved in groups (acknowledge collaborators) but must be written up individually

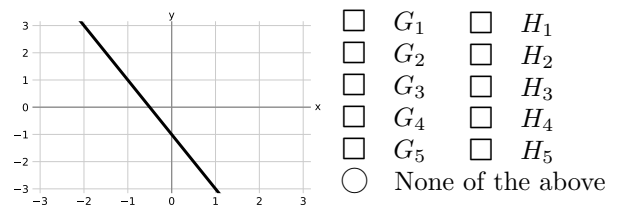
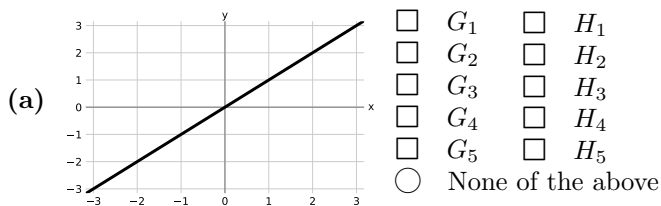
Submission: Your submission should be a PDF that matches this template. Each page of the PDF should align with the corresponding page of the template (page 1 has name/collaborators, question 1 begins on page 2, etc.). **Do not reorder, split, combine, or add extra pages.** The intention is that you print out the template, write on the page in pen/pencil, and then scan or take pictures of the pages to make your submission. You may also fill out this template digitally (e.g. using a tablet.)

First name	
Last name	
SID	
Collaborators	

Q1. Neural Networks: Representation

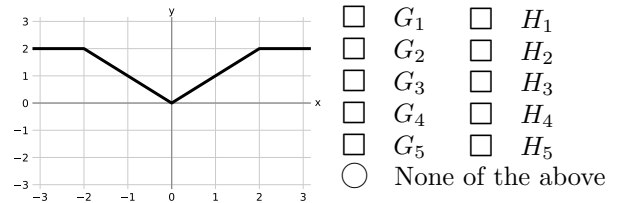
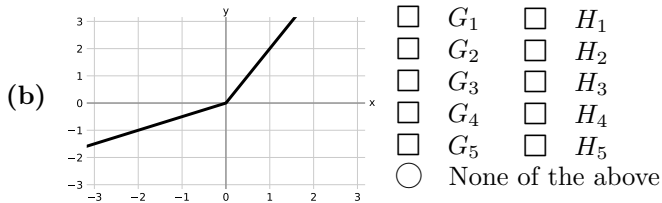
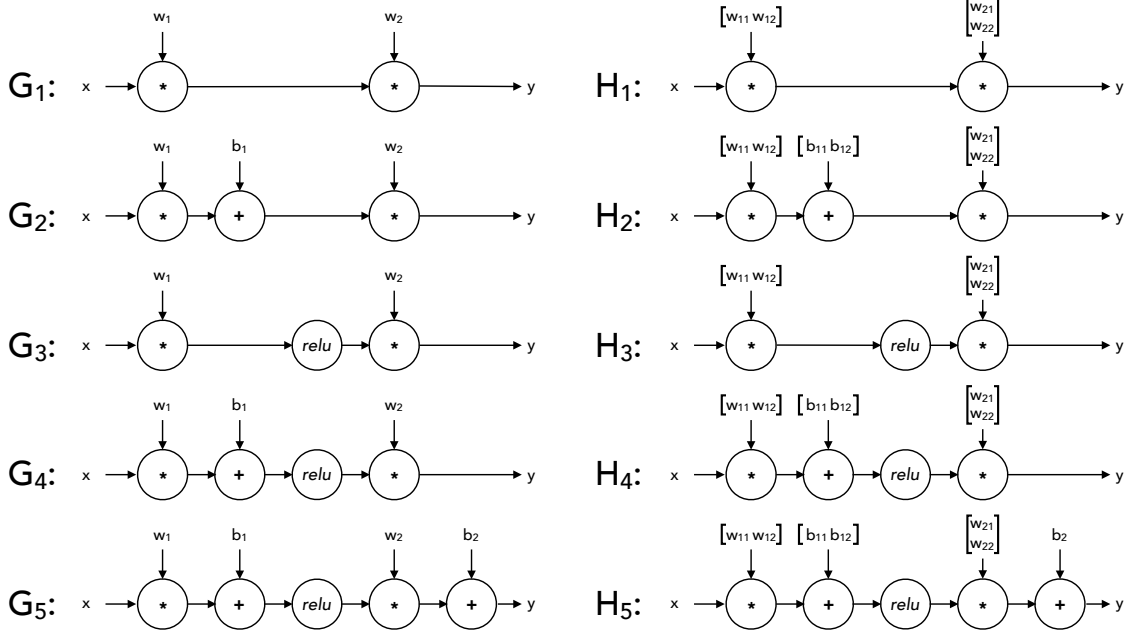


For each of the piecewise-linear functions below, mark all networks from the list above that can represent the function **exactly** on the range $x \in (-\infty, \infty)$. In the networks above, *relu* denotes the element-wise ReLU nonlinearity: $relu(z) = \max(0, z)$. The networks G_i use 1-dimensional layers, while the networks H_i have some 2-dimensional intermediate layers.

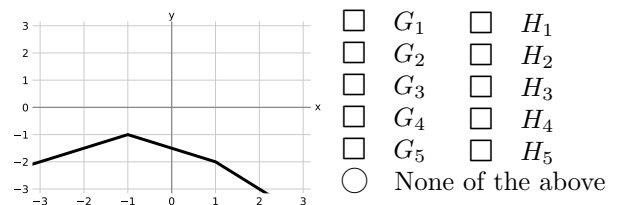
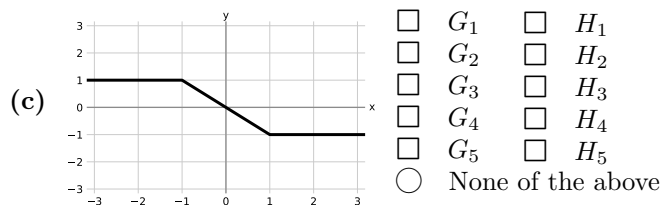


Self assessment If correct, write "correct" in the box. Otherwise, write and explain the correct answer.

The list of networks is reproduced below for your convenience:



Self assessment If correct, write "correct" in the box. Otherwise, write and explain the correct answer.



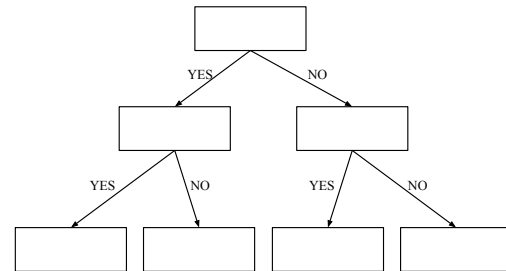
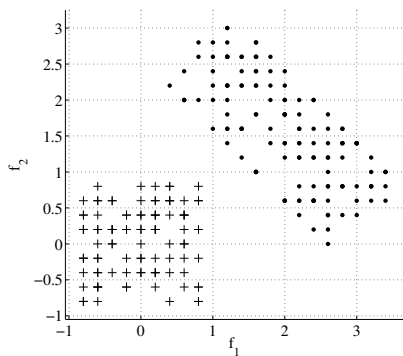
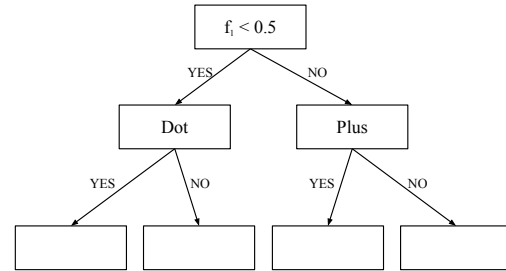
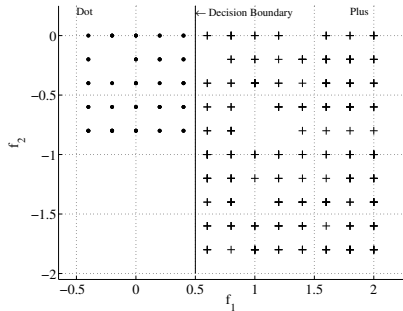
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Q2. Decision Trees

You are given points from 2 classes, shown as '+'s and '.'s. For each of the following sets of points,

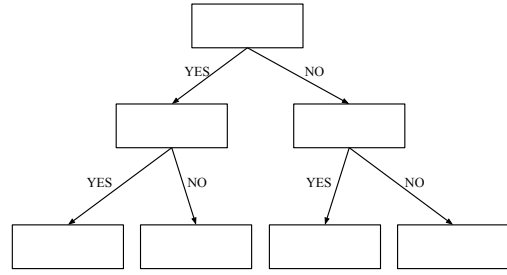
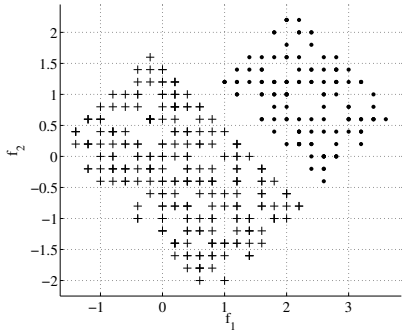
1. Draw the decision tree of depth at most 2 that can separate the given data completely, by filling in binary predicates (which only involve thresholding of a *single* variable) in the boxes for the decision trees below. If the data is already separated when you hit a box, simply write the class, and leave the sub-tree hanging from that box empty.
2. Draw the corresponding decision boundaries on the scatter plot, and write the class labels for each of the resulting bins somewhere inside the resulting bins.

If the data can not be separated completely by a depth 2 decision tree, simply cross out the tree template. We solve the first part as an example.

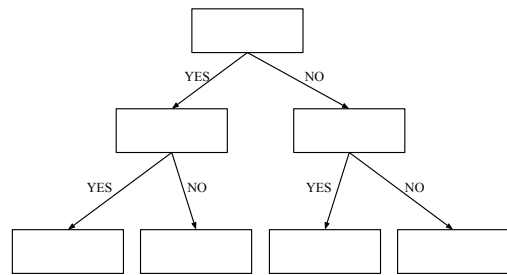
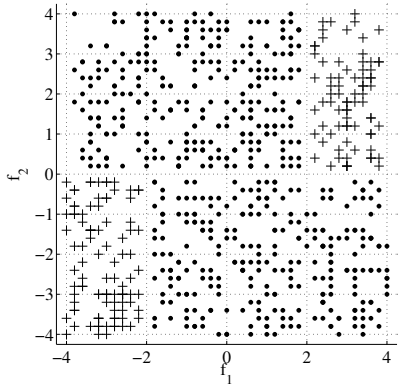


Self assessment If correct, write "correct" in the box. Otherwise, write and explain the correct answer.

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Self assessment If correct, write "correct" in the box. Otherwise, write and explain the correct answer.



Self assessment If correct, write "correct" in the box. Otherwise, write and explain the correct answer.