

CS156a Set 1

1. D
(i) is not learning, because all of the classifications are being given to the machine, nothing is being inferred from data. (ii) is supervised learning because labeled coins are presented, allowing the machine to learn from **labeled** results (the output is provided, making this supervised learning). (iii) is reinforced learning because a grade is provided as an output for the machine to judge the inputs on (how likely the move is to make them lose).
2. A
(i) is not suited for Machine Learning because there exists a mathematical way to model this. (ii) is suited for Machine Learning because there is a pattern, there's a lot of data, and there's no mathematical pattern for it. (iii) is not suited for Machine Learning because there exists a mathematical way to model this. (iv) is suited for Machine Learning because there exists a lot of data, there exists a pattern, and there's no mathematical way to model it.
3. D
Given that you've picked a black ball at first, there's a $2/3$ chance that you're in the bag with 2 black balls (bag 1) and $1/3$ chance you're in the bag with 1 black ball and 1 white ball (bag 2). The odds that the 2nd ball is black for bag 1 is 100%, and the odds for bag 2 is 0%. Thus the total probability that the 2nd ball is black is $1 \cdot (2/3) + 0 \cdot (1/3) = 2/3$.
4. B
 $(0.45)^{10} = 3.405 \cdot 10^{-4}$
5. C
 $1 - (1 - (0.45^{10})) = 0.289$
6. E
Each hypothesis has only one possible set of outputs, and thus calculates into the score formula the same way. Thus we have $\text{score} = 1 \cdot 3 + 3 \cdot 2 + 3 \cdot 1 + 1 \cdot 0 = 12$ for every hypothesis.

Justification for 7-10 are provided in the attached Jupyter notebook.

7. B
8. C
9. B
10. B