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CS156a Set 2

1. B
   Justification in attached Jupyter Notebook

2. D
   The values in the attached Jupyter Notebook are:
   $$v_{1_{avg}} = 0.500242$$
   $$v_{rand_{avg}} = 0.499345$$
   $$v_{min_{avg}} = 0.037664$$
   So when we apply those to the Hoeffding Inequality we have:
   $$v_1: \quad \varepsilon = 0.000424 \rightarrow 1 \leq 2e^{-2000*0.000424^2} \rightarrow 1 \leq 1.99928$$
   $$v_{rand}: \quad \varepsilon = 0.000655 \rightarrow 1 \leq 2e^{-2000*0.000655^2} \rightarrow 1 \leq 1.99828$$
   $$v_{min}: \quad \varepsilon = 0.12336 \rightarrow 1 \leq 2e^{-2000*0.12336^2} \rightarrow 1 \leq 1.21 * 10^{-13}$$
   Therefore c_1 and c_{rand} satisfy the Hoeffding Inequality but c_{min} does not.

3. E
   An error occurs when h makes an error and y does not (probability of $\mu * \lambda$) or when h does not make an error and y does make an error (probability of $(1-\mu) * (1-\lambda)$). Therefore the total probability that an error will occur is $(1-\mu) * (1-\lambda) + \mu * \lambda$.

4. B
   If $\lambda = 0.5$ then the probability that an error occurs is now $(1-\mu) * (0.5) + \mu * 0.5 = 0.5$. Therefore the probability that an error does not occur must be 0.5. Therefore the performance of h would then be independent of μ.

5. C
   Justification in attached Jupyter Notebook

6. C
   Justification in attached Jupyter Notebook

7. A
   Justification in attached Jupyter Notebook

8. D
   Justification in attached Jupyter Notebook

9. A
   Justification in attached Jupyter Notebook

10. B
    Justification in attached Jupyter Notebook