Corrections:

6.5: The formula for $\eta_t$ is incorrect, and should instead be:

$$\eta_t \doteq \max \left\{ 0, \ln \left( \frac{(1 - u)\ell_t}{u(1 - \ell_t)} \right) \right\}.$$ 

Hints:

5.9(c): Start by proving the stated inequality conditional on $w$ being chosen so that $w \cdot w^* \geq 0$. Then use this fact to obtain the same result without such conditioning (possibly with a different constant).

Also, you might find Markov’s inequality useful, which states that, for any nonnegative real-valued random variable $X$, and for any constant $c > 0$,

$$\Pr[X \geq c] \leq \frac{\mathbb{E}[X]}{c}.$$ 

6.6: Create an online learning algorithm that makes its predictions on each round using a (deterministic) weighted majority vote of the classifiers in $\mathcal{H}$.

6.9(d): Use the fact that $M = -M^\top$. Also, when computing the value of $M$, consider $P^\top MP$, for any distribution $P$. 