

Week 10

1. Exercise 6.2, Chapter 6, page 12.
2. Exercise 6.3, Chapter 6, page 12.
3. Exercise 6.4, Chapter 6, page 12.
4. Exercise 6.5, Chapter 6, page 13. Note: Line 3 of this problem should state instead that $\mathbb{P}(X_i=0) = \mathbb{P}(X_i=1) = 0.5$ for each i .
Hint: Show first that if $x, y \in \{0, 1\}$

$$\mathbb{P}(X_i=x, Y=y) = (1/2)a_{xy}.$$

Let $\bar{z} = ((x_1, y_1), (x_2, y_2), \dots, (x_n, y_n))$ represent an observation of the random variable. Let $n_{00}(\bar{z})$ be the number of pairs (x_i, y_i) in \bar{z} which are equal to $(0, 0)$. Define $n_{01}(\bar{z})$, $n_{10}(\bar{z})$, and $n_{11}(\bar{z})$ similarly. Using the identity above, express the likelihood function in term of $n_{00}(\bar{z}), n_{01}(\bar{z}), n_{10}(\bar{z}), n_{11}(\bar{z})$.

When you go to maximize the likelihood function, remember that $a_{01} = 1 - a_{00}$ and $a_{11} = 1 - a_{10}$.

5. Exercise 6.6, Chapter 6, page 24: part (a) only.

See also the problems on MAP estimation suggested in the additional notes. Ask for class discussion if you have questions (no answers posted; they are very easy.)