

**CODING THEORY, MATH 567**  
**PROBLEM SET 1**  
**DUE: FRIDAY JANUARY 31**

1. a) Do §1.1, Exercise 2.  
b) Do §1.1, Exercise 8.
2. Do §1.1, Exercise 12.
3. Do §1.1, Exercise 18.
4. Do §1.2, Exercise 9.
5. Do §1.2, Exercise 10. Note: If  $X$  is a random variable with range  $\{x_1, x_2, \dots, x_n\}$  and

$$f : \{x_1, x_2, \dots, x_n\} \rightarrow \{y_1, y_2, \dots, y_m\}$$

is a map, then  $Y = f(X)$  is a random variable with range  $\{y_1, y_2, \dots, y_m\}$  such that

$$P(Y = y_i) = \sum_{j, f(x_j)=y_i} P(X = x_j).$$

for all  $i$ . (Whenever  $X$  has outcome  $x_j$ , then  $Y$  has outcome  $f(x_j)$ .)

6. a) Do §2.1, Exercise 2.  
b) Do §2.1, Exercise 3.
7. a) Do §2.1, Exercise 8.  
b) Do §2.1, Exercise 9.
8. Do §2.1, Exercise 16.