

## 17 Users as Interference

We have a multi-access channel for two binary sources where the output equals  $Y = X_1 \oplus X_2$ , where  $\oplus$  means exclusive-or:  $(0 \oplus 0) = (1 \oplus 1) = 0$  and  $(0 \oplus 1) = (1 \oplus 0) = 1$ . The probabilities of nonzero values  $\Pr[X_i = 1]$  equal  $p_i$ ,  $i = 1, 2$ .

- (a) Suppose the decoder is only interested in decoding  $X_1$  even though the second source is producing what amounts to interference. What is the capacity of this communication link?
- (b) Now suppose the decoder wants to decode both sources. What is the rate region?