Problem # 2 (30). The binary "Z" channel shown below is defined by the transition probabilities: $P[Y = 0|X = 0] = 1$, $P[Y = 1|X = 1] = 1 - \epsilon$, and $P[Y = 0|X = 1] = \epsilon$, where random variable X is the channel input bit, and Y is the received bit. Let the data source produce "on" bits with probability $P[X = 1] = p$. A bit generated by the source is transmitted n times (independent transmissions) through the channel. (Recall that a repetition code reduces the receiver error probability, as seen in class). The receiver accumulates the sequence of n received bits and then estimates the source bit.

a) Suppose the receiver accumulates a sequence of n *zeros*. What is the probability that the source bit was indeed *zero* (your answer should be in terms of the given n, p, and ϵ)?

b) What is the probability that the source bit was *zero* if the receiver accumulates a sequence that contains $n - 1$ *zeros* and a single *one*?