**R-19.2**

This is a Chernoff Bound problem, according to Theorem 19.12 in textbook page 552:

, where δ > 0. Here, The probability is about 0.9n/3 to win majority games.

**C-19.7**

According to textbook page 535, by linearity of expectation, to get all coupons in red we need nHn times, where Hn means nth harmonic number. Similarly, all blue coupons need to visit 2nHn times to collect. In this case, the chance of getting one color coupon is ½, thus, we need double the visit times needed to get all coupons, which means we need 4nH2n times for blue coupons and 2nHn times for red coupons. For the times we do not get blue coupons, we get red coupons. Thus, the total expected visit times to get all 3n coupons in both colors would be 4nH2n

**A-19.2**

The total combination of this lottery is 46\*56^5, which means where are that many of distinct coupons need to be collected. Thus, people need to visit and buy 46\*56^5 H46\*56^5 tickets to assure 100% certainty, which is approximately tickets sold, which is around half trillion tickets.