

HOMWORK 02 SOLUTION

STATS 13, SECTION 1, SPRING 2013

1. Two events A and B are independent if their joint probability equals the product of their probabilities:

$$P(A \cap B) = P(A)P(B)$$

$0.11 \neq 0.30 \cdot 0.15$ So the two events are not independent.

2. Use the binomial probability formula: $\binom{n}{k}p^k(1-p)^{n-k}$

2(a) 0.06171419

2(b) 0.1844332

2(c) 0.07127698

2(d) 0.02662646

3(a) 0.2140583

3(b) 0.3567639

3(c) 0.2675729

3(d) 0.1616049

4. There are 38 numbers on a standard American Roulette wheel. The probability of a number in 1-18 showing up is $\frac{18}{38} = 0.4736842$

As you take more samples, the empirical probability will asymptote to the theoretical probability.

5(a) 0.00064

5(b) 0.0093

5(c) In 100 simulations I did not have any runs of 5 A's in a row. However your results may differ as this is a stochastic process. I had the case of 2 A's and 2 T's occur exactly once.

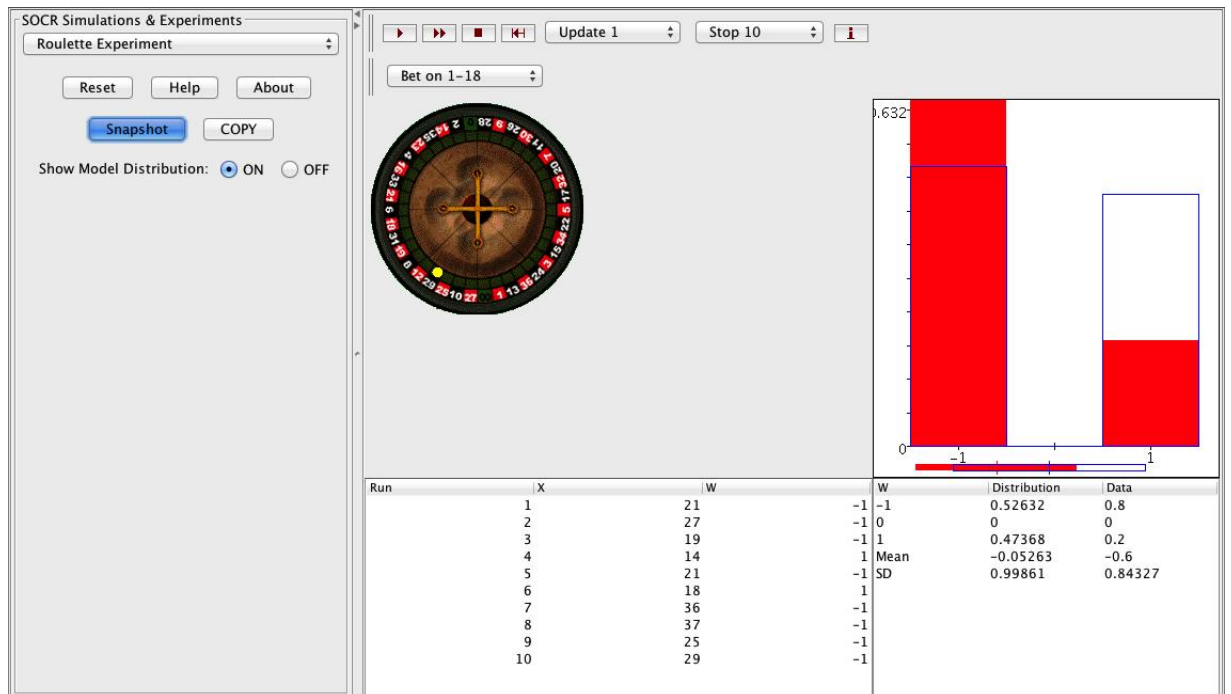


FIGURE 1. "10 Spins"

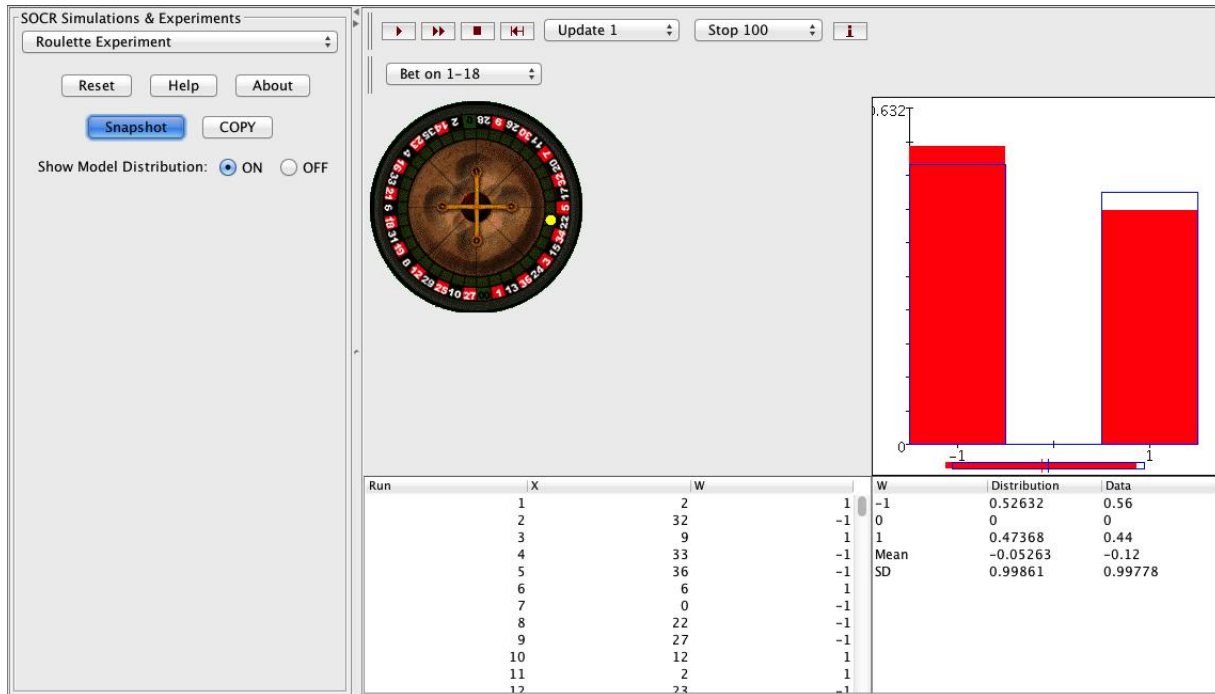


FIGURE 2. "100 Spins"

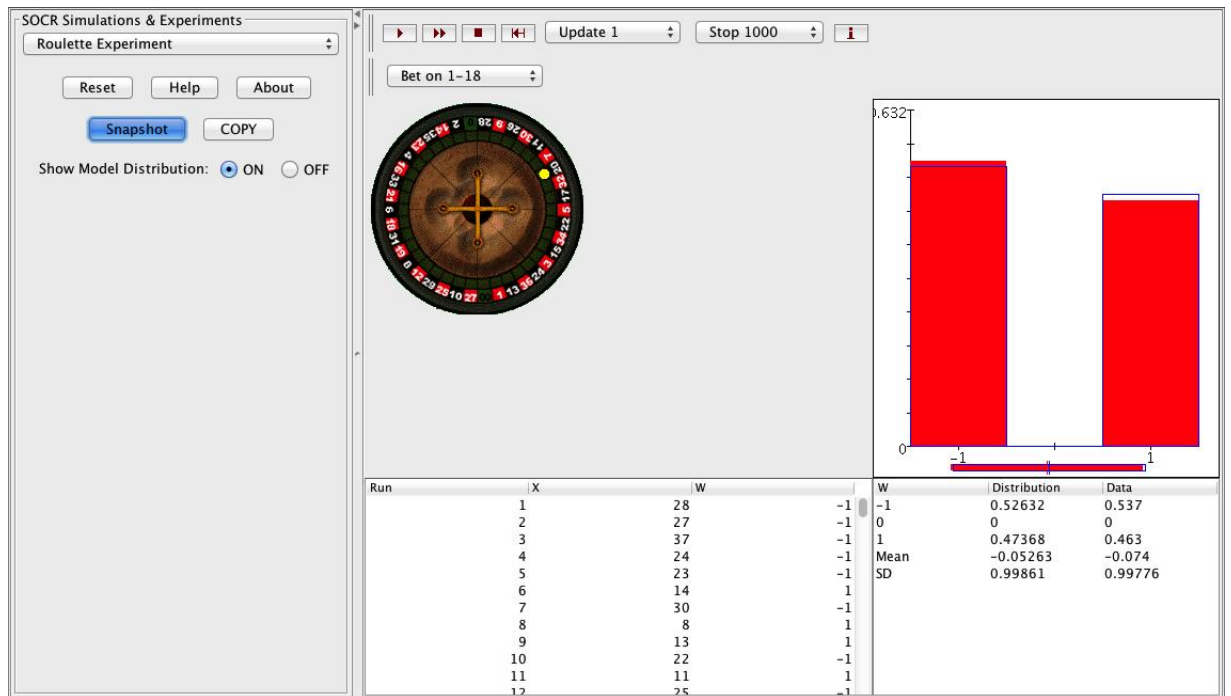


FIGURE 3. "1000 Spins"