Consider first an American roulette wheel. Let W be the amount of winnings. The probability distribution for winnings is

$$W = \begin{cases} 1 & \text{with probability } 18/38 \\ -1 & \text{with probability } 20/38. \end{cases}$$

This implies that the expected payoff is

$$E(W) = (1)\left(\frac{18}{38}\right) + (-1)\left(\frac{20}{38}\right) = -.0526.$$

That is, on average the player loses 5.26¢ on each play. The variance of the winnings is

$$V(W) = [1 - (-.0526)]^2\left(\frac{18}{38}\right) + [-1 - (-.0526)]^2\left(\frac{20}{38}\right) = .9972,$$

which means that $SD(W) = \sqrt{.9972} = .999$. Note that this is also the result using the shortcut formula

$$V(W) = (1)^2\left(\frac{18}{38}\right) + (-1)^2\left(\frac{20}{38}\right) - (-.0526)^2 = .9972.$$

Calculations for the European roulette wheel are done in the same way, except that the probability distribution for the winnings is different:

$$W = \begin{cases} 1 & \text{with probability } 18/37 \\ -1 & \text{with probability } 19/37. \end{cases}$$

This implies that the expected payoff is

$$E(W) = (1)\left(\frac{18}{37}\right) + (-1)\left(\frac{19}{37}\right) = -.027.$$

That is, on average the player loses 2.7¢ on each play. The variance of the winnings is

$$V(W) = [1 - (-.027)]^2\left(\frac{18}{37}\right) + [-1 - (-.027)]^2\left(\frac{19}{37}\right) = .9993,$$

which means that $SD(W) = \sqrt{.9993} = .9996$.