Roulette Problems

An American roulette wheel has 38 slots: 18 are red, 18 are black and two are green. The 36 red and black ones are numbered from 1 through 36. The two green ones are numbered 0 and 00. You may bet on either red or black or on various combinations of numbers. If the ball lands on the color or number(s) you bet on, you win. If it lands on anything else, including either of the two green slots, you lose. Assuming you bet $1, calculate the expected value and payback of each of the following gambles:

1. Bet on one color. If you win, you get paid the original $1 bet plus an additional $1.

2. Bet on one number. If you win, you win the original $1 plus an additional $35.

3. Bet on two numbers. If you win, you win the original $1 plus an additional $17.

4. Bet on a combination of three numbers. If you win, you win the original $1 plus an additional $11.

5. Bet on a combination of four numbers. If you win, you win the original $1 plus an additional $8.

6. Bet on a combination of five numbers. If you win, you win the original $1 plus an additional $6.

7. Bet on a combination of six numbers. If you win, you win the original $1 plus an additional $5.

8. Bet on a combination of 12 numbers. If you win, you win the original $1 plus an additional $2.

Hint: You will get either -.0526 or -.0789 for the expected values.