

Remember: For full credit you must work the problem correctly and present the answer in a simple form (when a simple form exists).

1. Simplify $\prod_{1 \leq i \leq n} a^c$.

2. Simplify $\prod_{1 \leq i \leq n} a^{bi+c}$.

3. Suppose you have ten cards, one card for each value from 1 to 10. Suppose you draw three cards at random (without replacement)? What is the probability that the sum of the values of the three cards is 21?

4. Suppose you have 13 cards, one card for each value from 1 to 9 and four cards with the value 10. Suppose you draw three cards at random (without replacement)? What is the probability that the sum of the values of the three cards is 21?

5. Simplify $\sum_i \binom{n}{i} x^{k-i} p^i (1-p)^{n-i}$.

6. Simplify $\sum_{i \geq 0} \binom{n}{i} a^{2i}$.

7. Simplify $\sum_i \binom{a}{a-i} \binom{a-i-1}{a-b} (a-i) 2^{b-i}$.

8. Simplify

$$\sum_{n_1 > 0, n_2 > 0, \dots, n_i > 0} \binom{n}{n_1, n_2, \dots, n_i} 2^{n_1 + n_2 + \dots + n_i}.$$