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1. (a) **Conclusion:**
   $n = C(k,2) + C(k,1) = \frac{k!}{2!(k-2)!} + k = \frac{k(k-1)}{2} + k$
   Explaination:
   There are only 2 possible cases while picking up 2 from total k prime numbers: different or same. So we can add the counts of the above 2 cases as the total combinations.

   (b) **Conclusion:**
   $n = \frac{P(k+r,k+r)}{r!k!} - \frac{P(k+r-1,k+r-1)}{(r-1)!k!} = \frac{(k+r)!}{r!k!} - \frac{(k+r-1)!}{(r-1)!k!} = \frac{k(k+r-1)!}{r!k!}$
   Explaination:
   To solve this problem, we can create a model which has r idential divider and k sorted items (prime numbers). The number just after each divider would be considered as one of the selected numbers. The First part of the polynominal represents the counts of the items + dividers combination. Second part represents the counts of the cases that at least one divider locates at the end of the queue.

   (c) **Conclusion:**
   Explaination:

2. (a) And a multinomial: $\binom{n}{1,2,3}$

   (b) A fraction with a binomial: $\frac{\binom{x}{y}}{z^2}$

3. A summation: $\sum_{i=1}^{n} i^2$

4. A product in math mode:

$$\prod_{i=1}^{n} x = x^n$$

5. And a line
   break.