

Answer on Question #68875 – Math – Discrete Mathematics

Question

1. For a sequence 128, 64, 32, what is the value 12th term of this sequence?

Solution

$$b_1 = 128, \quad q = \frac{b_2}{b_1} = \frac{64}{128} = \frac{b_3}{b_2} = \frac{32}{64} = \frac{1}{2},$$

$$b_n = b_1 \cdot q^{n-1}.$$

The 12th term of this sequence is

$$b_{12} = 128 \cdot \frac{1}{2^{11}} = \frac{2^7}{2^{11}} = \frac{1}{2^4} = \frac{1}{16}$$

Answer: $\frac{1}{16}$.

Question

2. The 3rd and 7th term of a G.P. are 81 and 16 respectively, find the 1st and 5th term

Solution

The 3rd term of a geometric progression is

$$b_3 = b_1 \cdot q^2 = 81,$$

The 7th term of a geometric progression is

$$b_7 = b_1 \cdot q^6 = 16.$$

Then

$$\frac{b_7}{b_3} = \frac{b_1 \cdot q^6}{b_1 \cdot q^2} = q^4 = \frac{16}{81},$$

$$q = \frac{2}{3}.$$

The 1st term of a geometric progression will be

$$b_1 = \frac{b_3}{q^2} = \frac{81}{q^2} = \frac{81 \cdot 9}{4} = \frac{729}{4}.$$

The 5th term of a geometric progression will be

$$b_5 = b_1 \cdot q^4 = \frac{729 \cdot 16}{4 \cdot 81} = 36.$$

Answer: $b_1 = \frac{729}{4}$, $b_5 = 36$.

Question

3. A student is to answer all the nine questions in an examination. It is believed that the sequence in which the questions are answered may have a considerable effect on the performance of the student. In how many different order can the question be answered

Solution

The number of permutations of 9 distinct objects is equal to

$$9! = 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 362880.$$

Answer: $9!$

Question

4. A bus starts with 6 people and stops at 10 different stops. how many different ways can the 6 people depart if any passenger can depart at any bus stop

Solution

There are 10 stops and passenger can leave at any stop, so the 6 people can depart in 10^6 different ways.

Answer: 10^6 .

Question

5. How many 3 digits numbers greater than 300 can be formed using the digits 1, 2, 3, 4, 5 if no digit can be repeated and the first digit cannot be 3?

Solution

We have 3 spaces for 3 digits: _ _ _

Only 4 or 5 (2 variants in total) can be assigned at the first space as the first digit.

One of four remaining digits can be assigned at the second space as the second digit.

One of three remaining digits can be assigned at the third space as the third digit.

So, $2 \cdot 4 \cdot 3 = 24$ different numbers can be formed.

Answer: 24.

Question

6. In how many way can 6 people take place at a round table?

Solution

Formula for counting ways in which n people can take place at a round table is

$$(n - 1)!,$$

so

$$(6 - 1)! = 5! = 120.$$

Answer: 5!