Factorial fun

Problem

We denote the product of the first 20 natural numbers by $20!$ and call this 20 factorial.

(a) What is the highest power of 5 which is a divisor of 20 factorial? Just how many factors does $20!$ have altogether?

(b) Show that the highest power of k that divides $500!$, where k is an integer and $k(t+1) > 500 > kt$ is

$$[500/k] + [500/k2] + \cdots + [500/kt],$$

where the square brackets are used to denote the integer part of the number inside.

(c) How many factors does $n!$ have?

Relevance

NA3 What are highest common factors and why do they matter?

