Math 3345
Fundamentals of Higher Mathematics

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Course Info

Reading for Wednesday, February 26

pgs. 65-66

HW15 Due Friday, February 28

- Section 4 Exercise 20
- Section 5 Exercises 6, 11

Midterm 2 Wednesday, March 5 in class

Midterm 2 will cover Sections 1-5.

Warm-up Problems

Problem 1

Solution to Section 4 Exercise 18a:

If x is a rational number such that $x^3 = rx^2 + sx + t$ where r, s and t are integers then x is an integer.

Problem 2

Solution to Section 4 Exercise 22:

Let $p \in \{2, 3, 4, \cdots\}$. Suppose that for all $x, y \in \mathbf{Z}$, if p divides xy then p divides x or p divides y.

Binomial coefficients

You've probably seen a different definition of $\binom{n}{k}$

Definition 3 (Factorials)

$0! = 1$ and for each $n \in \mathbf{N}$

$$\begin{aligned} n! &= 1 \cdot 2 \cdot 3 \cdot \cdots \cdot n \\ &= \prod_{k=1}^{n} k. \end{aligned}$$

You've probably seen the binomial coefficients defined via the formula:

$$\binom{n}{k} = \frac{n!}{k!(n-k)!}$$

Our definition of $\binom{n}{k}$ is different so for us this is a theorem that must be proven.

Binomial coefficients

Theorem 4

For all $n, k \in \omega$ such that $0 \leq k \leq n$

$$\binom{n}{k} = \frac{n!}{k!(n-k)!}.$$