This document contains explanations of notation and definitions that we may go over quickly in lecture. If you were confused about notation or think you missed a definition, look here!

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- **Def** An integer n is _divisible_ by integer m if there exists an integer k such that $n = mk$.

  We sometimes say "m divides n" to mean the same thing as "n is divisible by m."

  We use the shorthand $m|n$ to say m divides n.

  Another equivalent definition of divisibility is that $m|n$ if and only if $\frac{n}{m}$ is an integer.

<u>ex</u> 0 is divisible by 2 because we can choose $k = 0$ and write $0 = 2 \cdot 0$.
(n labels the 0, m labels the 2)

   5 is not divisible by 4 because there is no integer k so that $5 = 4k$.

   -33 is divisible b 11 because $-33 = 11 \cdot (-3)$.

• The ellipsis (...) notation in math:

... means "continuing onward in the same manner."

So $1, 2, ..., 99, 100$ means "all of the integers between 1 and 100."

By convention, we put two items at the start (here, 1 and 2) and two at the end to be very explicit about the pattern. But in general, look at examples and use your own judgment about how to use ... .

<u>ex</u> $-100, -98, ..., -4, -2$ even negative integers between -100 and -2

$..., -2, -1, 0, 1, 2, ...$ all integers

$c_0 x_0 + c_1 x_1 + c_2 x_2$ polynomials up to degree 2

$c_0 x_0 + c_1 x_1 + ... + c_{k-1} x_{k-1} + c_k x_k$ polynomials of degree k

- Exponent math rules.

  We can simplify expressions with exponents as long as they shave the same base!

  $\underline{ex}$ 5^{8} divided by 5^{2} is $\dfrac{5^{8}}{5^{2}} = 5^{6}$.

  ← exponent

  ↗ base

  $$x^{10} \cdot x^{11} = x^{21}$$

  $$\dfrac{10^{k}}{100} = \dfrac{10^{k}}{10^{2}} = 10^{k-2}$$

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- $\underline{Def}$ A $\underline{rational\ number}$ is a real number that can be expressed as a ratio n/m of integers n and m where $m \neq 0$.

  $\underline{ex}$ 1.2 is rational because we can choose $n = 6$ and $m = 5$ so that $1.2 = n/m = 6/5$.

  -5 is rational because $-5 = {}^{-5}/_{1}$.

  π is not rational.

  0.33... is rational because it equals $1/3$.

- **Def** The absolute value of a number x, written $|x|$, is the distance from x to 0, disregarding the sign of x.

ex $|5| = 5$

$|-5| = 5$

$|-1.2| = 1.2$

- **Def** Given a proposition of the form "if a then b", its converse is the proposition "if b then a."

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- **Def** An integer n is odd iff there is an integer k such that $n = 2k+1$.

ex -11 is odd because $-11 = 2(-6)+1$
10 is not odd because there is no integer k so that $10 = 2k+1$.