Updated February 20, 2019.

Instructions

Pre-class assignments are intended to help you get more out of class. You are not expected to provide a complete solution, but you should give it your best attempt and try to reflect on some of the big ideas. If you are not confident in your solution, describe some *specific* points where your understanding could be improved. Write out all your work and questions and submit them in writing (not in LaTeX) at the beginning of class on the due date.

January 23

Section 1.1

- No pre-class homework.

January 25

Section 1.2

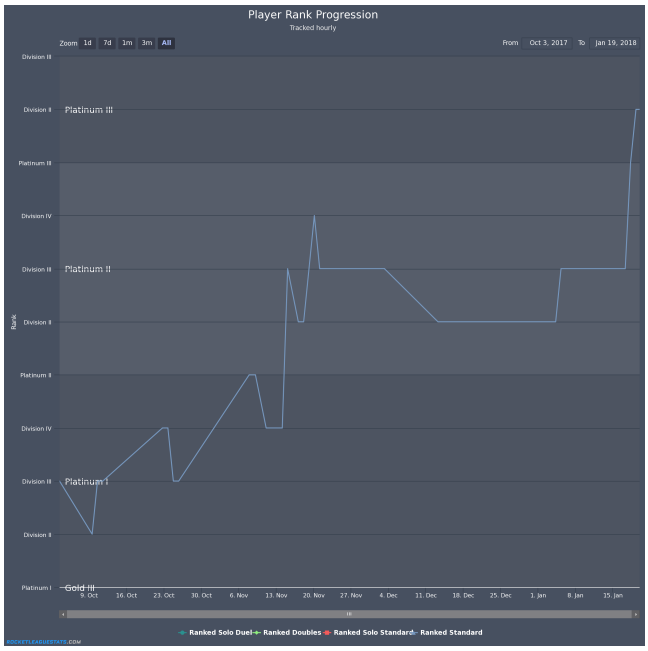
- Optional viewing: Watch a video on making rigorous definitions.
  https://www.youtube.com/watch?v=RoqoSxUoK-A
  - The important bit from this video is the definition of an even integer: An integer n is said to be **even** if there exists another integer k such that $n = 2k$.
- Watch a video on know-show tables.
  https://www.youtube.com/watch?v=H8LLINU6ebY
- Construct a know-show table for the following conditional statement:
  If m and n are even integers, then mn is an even integer.

January 28

Section 2.1

- Read the definitions of conjunction, disjunction, negation, and implication on page 33 in the text, and take a look at the truth tables for these operations on page 36.
- Watch a video on using truth tables to analyze compound statements.
  https://www.youtube.com/watch?v=d2yksDk4h6s

- Construct a truth table for the following compound statement: I played Rocket League for six consecutive hours and I did not reach Diamond rank.



January 30

Section 2.2

- Watch a video on logical equivalence.
https://www.youtube.com/watch?v=oY8Xt5GvZ1g
- Use truth tables to prove the following two logical equivalences. (These are very useful equivalences known as DeMorgan's Laws.)

$$\neg(P \vee Q) \equiv (\neg P) \wedge (\neg Q)$$
$$\neg(P \wedge Q) \equiv (\neg P) \vee (\neg Q)$$

February 1

Section 2.3

- Optional viewing: Watch a video introducing the concept of a set.
https://www.youtube.com/watch?v=01OoCH-2UWc
- Watch a video introducting set builder notation.
https://www.youtube.com/watch?v=DEhWj-52rlw
- What elements belong to the set $\{n \in \mathbb{Z} \mid n^2 < 16\}$?
- Use set builder notation to describe the set $\{1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \dots\}$.

February 4

Section 2.4

- Watch a video introducing universal and existential quantifiers.
  https://www.youtube.com/watch?v=6qTzP03waOA
- Write each of the following statements in English and explain why the statement is false.

$$(\exists x \in \mathbb{R})(x^2 < 0)$$

$$(\forall n \in \mathbb{Z})(n^2 \geq 1)$$

February 6

Section 3.1

- Watch a video about integer divisibility.
  https://www.youtube.com/watch?v=dIfpZzX7bKo
- Show that each of the following statements is true.
  - $2 \mid 10$
  - $5 \mid 15$
  - $3 \nmid 8$

February 8

Section 3.1

- Watch a video about integer congruence.
  https://www.youtube.com/watch?v=_-ZMdsQyIJw
- Show that each of the following statements is true.
  - $6 \equiv 0 \pmod 3$
  - $6 \equiv 11 \pmod 5$
  - $6 \not\equiv 11 \pmod 4$

February 11

Section 3.2

- Watch a video about proof by contraposition.
  https://www.youtube.com/watch?v=hAFpc9abNFc

- Use contraposition to sketch a proof for the following proposition. (You need not write in full detail.)
  If n^3 is even, then n is even.

February 13

Section 3.3

- Watch an introduction to proof by contradiction.
  https://www.youtube.com/watch?v=YUL6HMJmTM4
- Sketch a proof by contradiction for the following statement: There are no integers m and n such that $6m + 15n = 2$. (Hint: Factor a common 3 from the lefthand side.)

February 15

Section 3.3

No pre-class homework.

February 18

Section 3.4

- Watch an introduction to proof by cases.
  https://www.youtube.com/watch?v=zmMk_YITBIo
- Sketch a proof by cases for the following statement: If a is even or b is even, then ab is even.

February 20

Class cancelled.

February 22

Section 3.5

- Watch a video on the division algorithm.
  https://www.youtube.com/watch?v=XHjSy_MT7u0
- Rewrite the expression $23 \div 4$ in the $a = bq + r$ form specified by the division algorithm.

February 25

Review for Exam 1

No pre-class homework.

February 27

Exam 1

No pre-class homework.