Cpts 515. 8/24/2020.

1. All lectures are through ZOOM.
2. You are NOT taking a vacation!
   Keep yourself busy!
3. My cell phone 509 338 5089.
   text me for questions & concerns.
4. Textbook: buy for job interview.
5. Two Exams Mid & Final. Both are take-home.
6. HW: 6. Do your best.

7. Grading: 30% (HW)
30% (Mid)
40% (Final).

8. Hard to get A. Easy to get F.

9. Spend two additional hrs for each lecture (50 min).

10. Zoom office hours:

T, T, 2:30 — 3:30 pm.

(Bonus office hours) Sunday noon — 4 pm.

Title: Advanced Algorithms.

2-3 wks { undergraduate 350 - equivalent. ← design & analysis of algs.

rest { topics in alg. design.

What's the diff between Undergrad Algs & graduate algs?

Differences:

A. Undergraduate algs.

a. problem is clear.

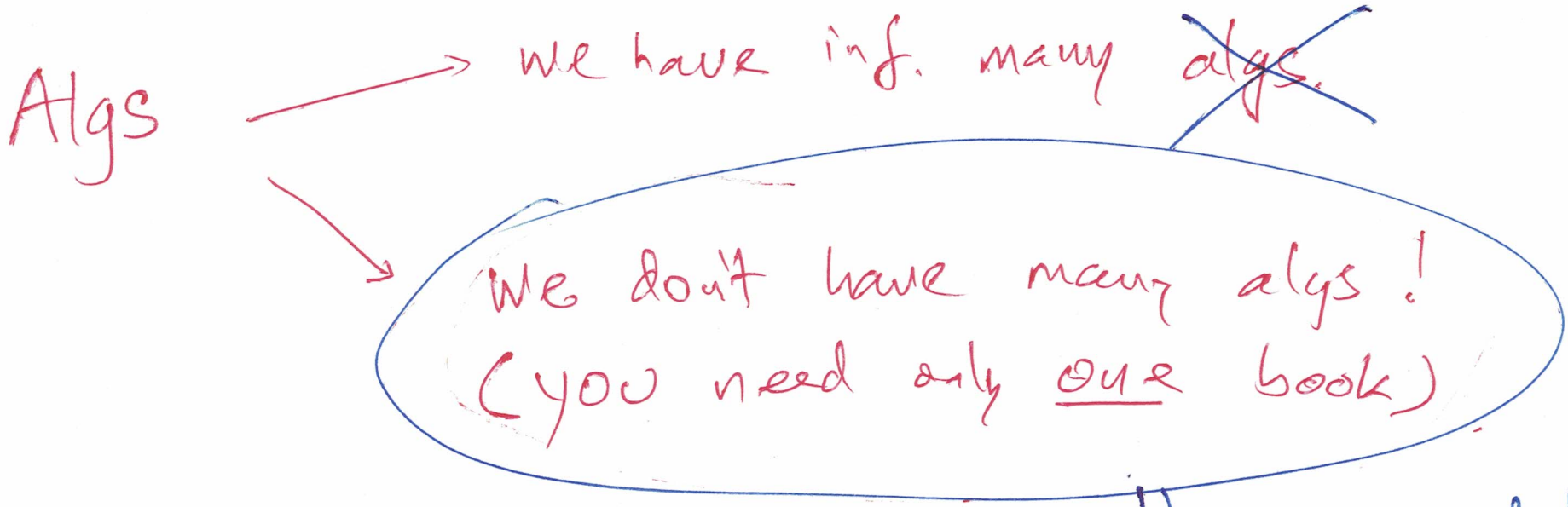
b. solutions are standard.

c. Alg design = (1). Micro-adjustment to classic algs.

(2). "hard problems" in UG = assemble several classic algs together.

For a good undergraduate student, deeply understand a few classic algs.

10 ~ 20.




B. Graduate Algs.

a. Problems are fuzzy!
   You make the problems clear. } part of research.

b. NO standard solutions!

c. you don't use classic & standard algs.
   you map the problems into one of mathematical area/problem.

All greatest work in CS are exples of solving problems indirectly.

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Any problems that can be solved ductly are simple problems.

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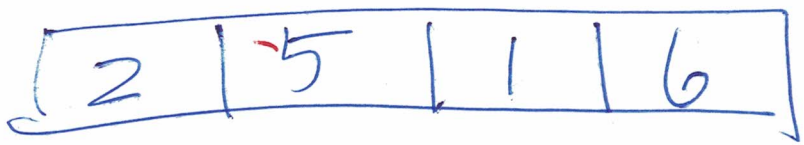
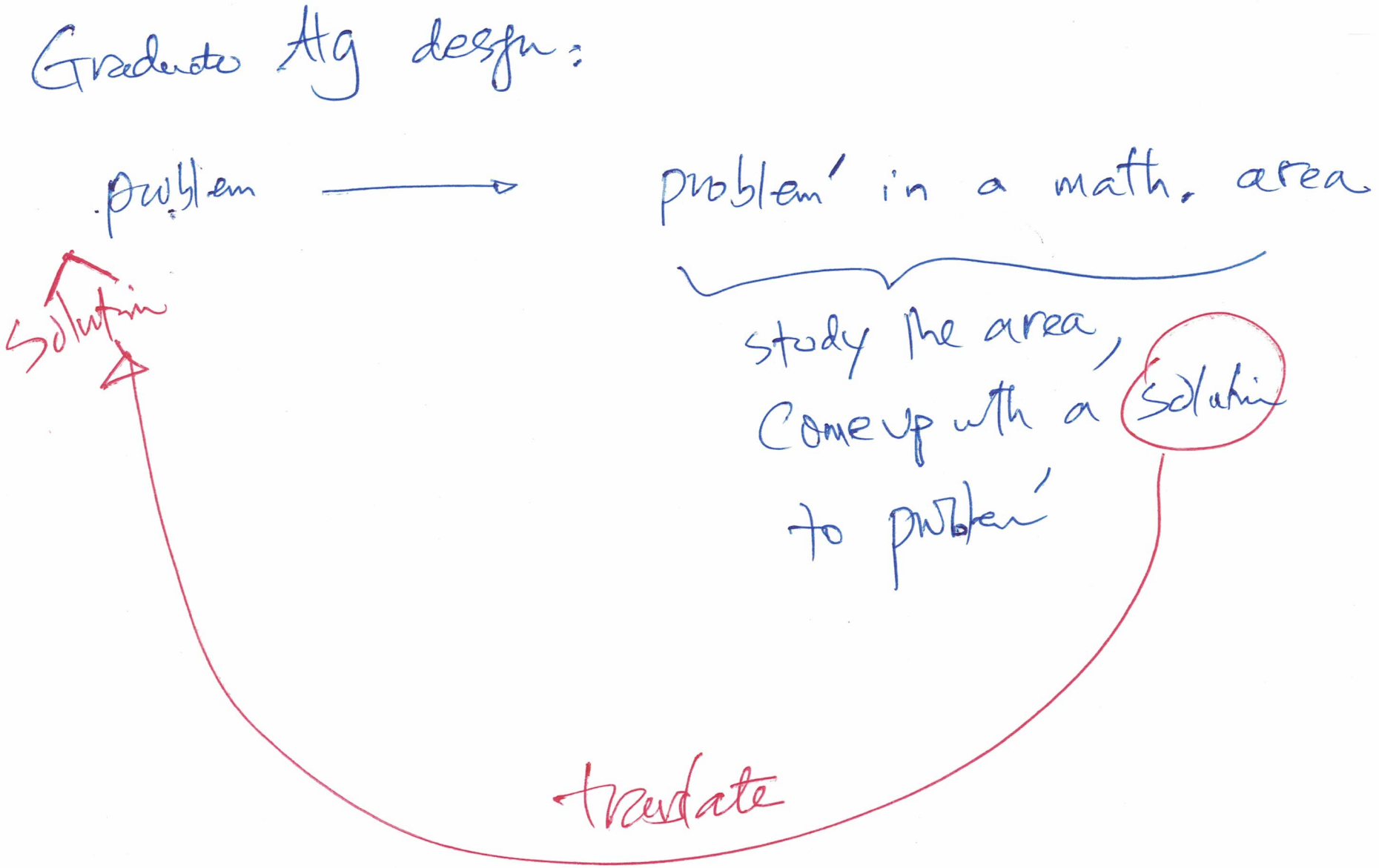
Undergraduate: Sorting




} swap(i, j).

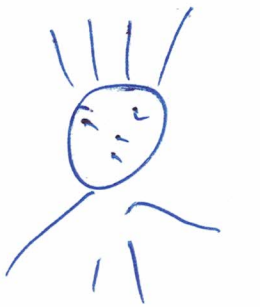
# Graduate Alg design:




solving problem / designing alg indirectly.
(reduction).

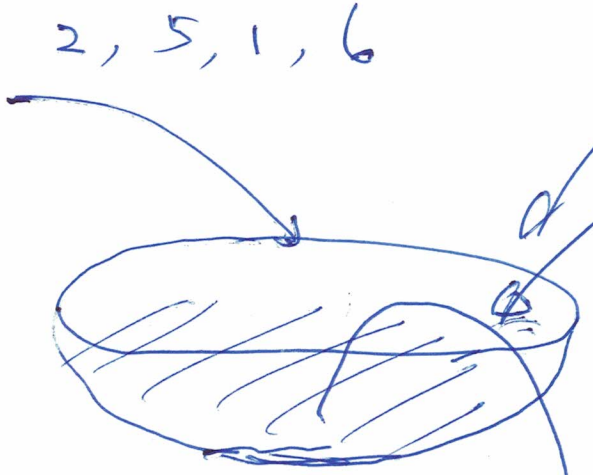
Suppose that sorting is a very difficult problem.

not true.



| 2 | 5 | 1 | 6 |
|---|---|---|---|

original




1, 2, 5, 6.

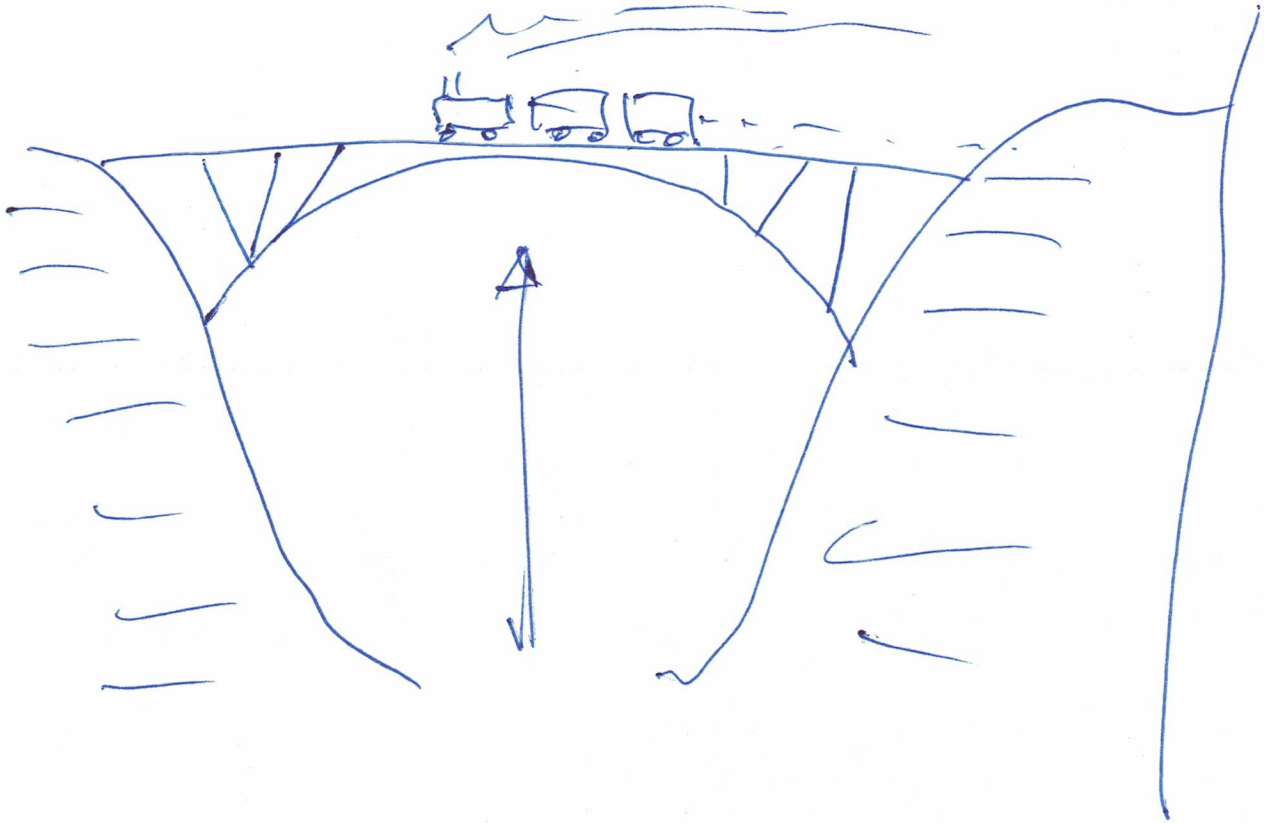
2, 5, 16,
Prism,
Fig.

Real-world Example.

1. Bridge building.

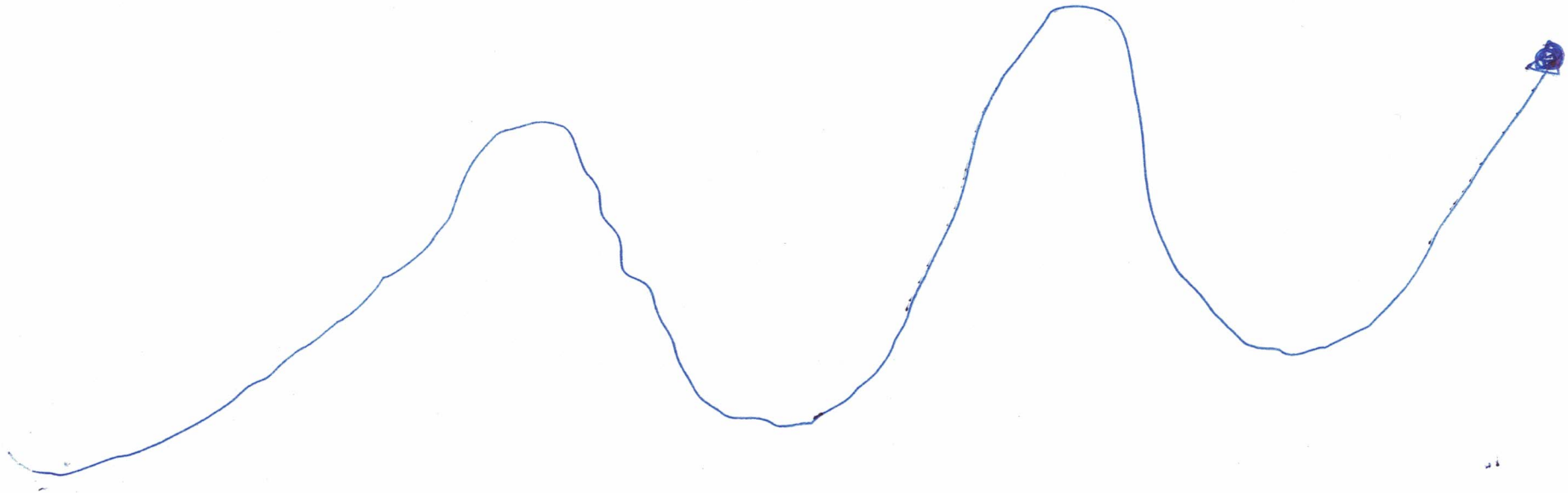
2. Stock Trading.

1.



build a bridge on screen.

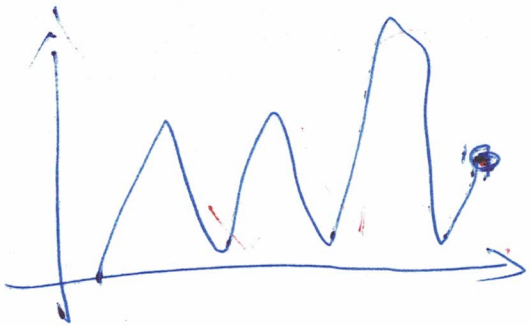
2. Stock Trading.



① NO.1. Valuable problem in algs.

② It's a hard problem.

③ you only have indirect solutions! ⟹



original pattern

translate

wallstreet.

happy or not?

molecules.

markov chains

} prediction

Walkstreet: 70%~80% trading are alg.

Job: ① Google, Amazon, Facebook....

② Investment Banks.

1. What's an alg ? ⟶ a rigorous & precise def.

2. What's a good alg ? = math. def.