

This is CS50

This was CS50





CS50



CS50





problem solving

2004





Press space to
start

THE WORLD'S
HARDEST GAME

VERSION ~~2.0~~
Scratch

BEGIN



Adesola Sanusi, Akshitha Ramachandran, Alaisha Sharma, Alex Babii, Alex Gibbons, Allie Kieras, Allison Kao, Amo Hothi, Andrew Shackelford, Andrew Tran, Anna Leah Ernst, Anton Ulyanov, Arnav Agrawal, Arturo J. Real, Athena Braun, Benjamin Doran, Bobby Min, Braedon Villano, Brennan Dizdar, Brian Yu, Caroline Teicher, Catherine Tu, Christina Bear, Christine Jou, Clarence Chan, Colton Ogden, Connor Doyle, Dan Coffey, Daniel Chen, Daniel Seong, Daniel Soberanes, Derek Wang, Doug Lloyd, Doug Smith, Douglas Kiang, Emily Yue, Emma Ling, Eric Abreu, Eric Twark, Erin Carvalho, Erin Olivieri, Ethan Zou, Filip Bujaroski, Gerardo Parra, Grace Zhang, Greg Middleider, Hailey James, Hamish Nicholson, Harshita Gupta, Helen Wu, Ian Sexton, Jack Deschler, Jackie Chea, Jason Ma, Jeffrey He, Jill Letteney, Jingchen Gao, John Na, John Noss, Junran Yang, Kareem Zidane, Kenny Boyle, Lauren Scully, Maria Zlatkova, Marty Heavey, Menaka Narayanan, Michael Chen, Michael Perusse, Michael Scott, Michael Wornow, Miles Fertel, Mustafa Bal, Nanya Edjah, Nick Hawke, Nick Wong, Patrick Hanaj, Pedro Cunha Farias, Pete Gartland, Phil Noël, Rob Bowden, Rodrigo Daboin Sanchez, Rongxin Liu, SJ Kim, Sam Lurye, Sebastian Schwartz, Sela Kasepa, Stefani Lahera, Teddy Liu, Teresa Lee, Thomas Chang, Thomas Lively, Tom Ballatore, Tom Henry, Tyler Griggs, Vicky Xu, Victor Yang, Vinny Viego, Vojta Drmota, Walter Martin, Wanqian Yang, Will Claybaugh

ES50













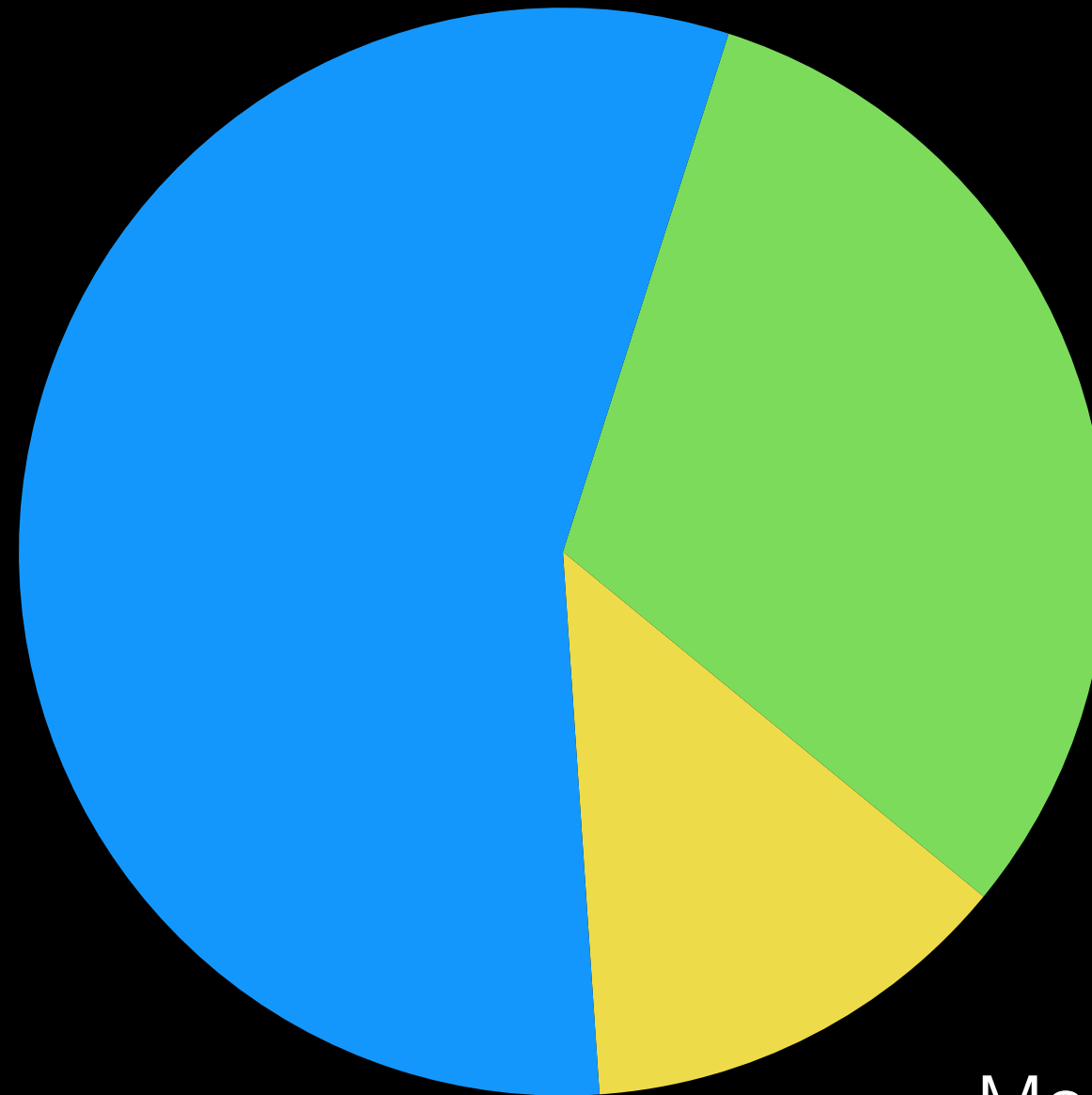
1:16 / 42:35





what ultimately matters in this course is not so much where you end up relative to your classmates but where you, in **Week 11**, end up relative to yourself in **Week 0**

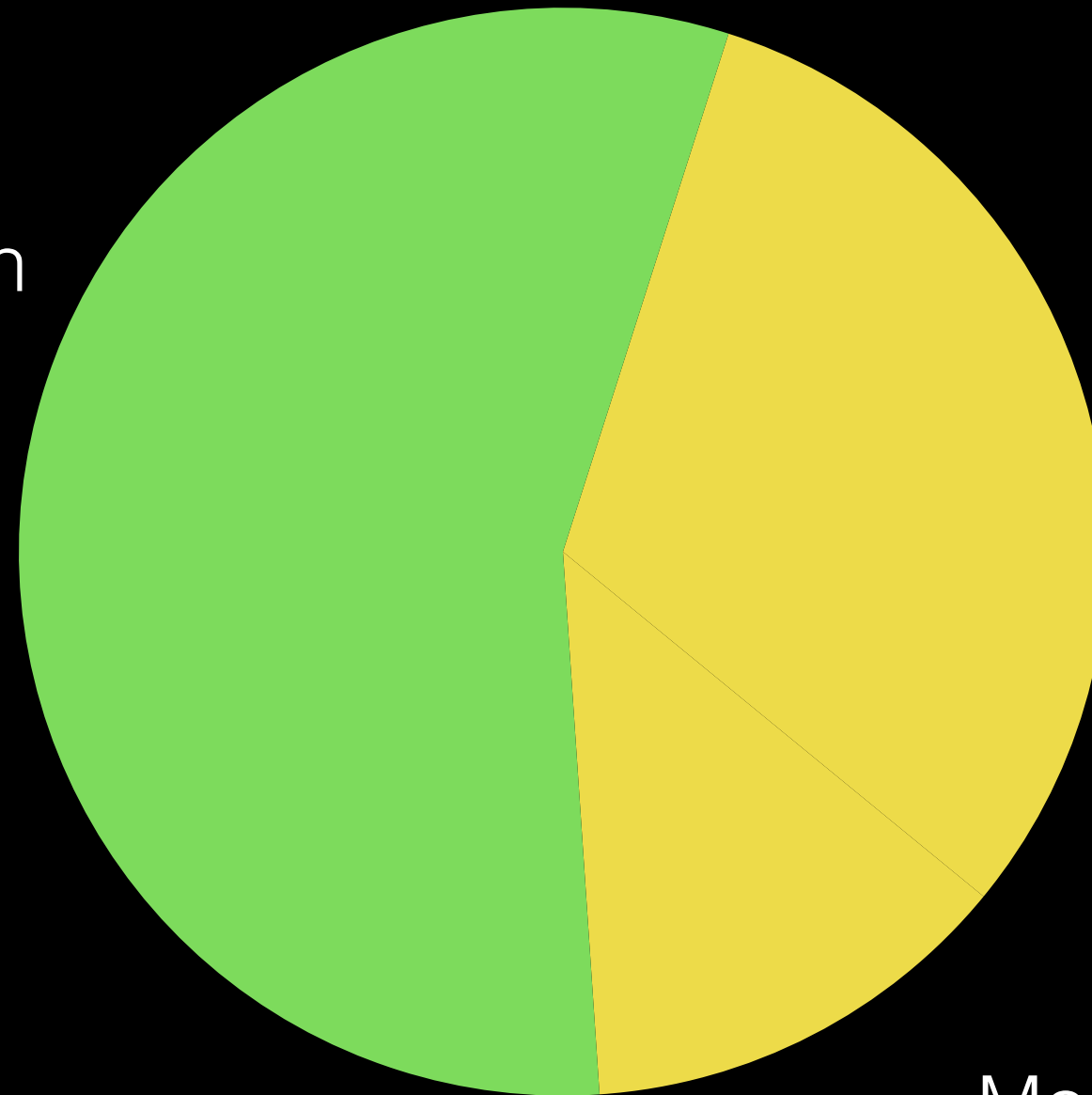
Less Comfortable



Somewhere in Between

More Comfortable

Somewhere in Between



More Comfortable

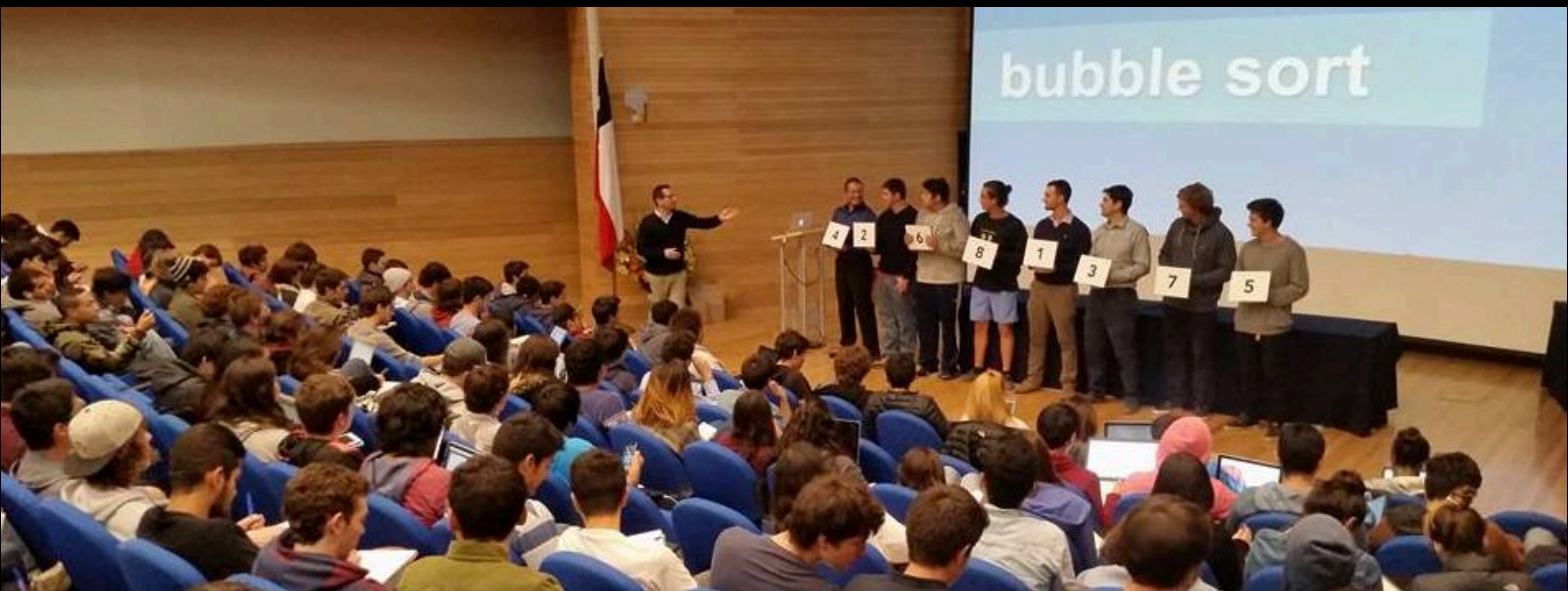
cs50.harvard.edu/apply



CS50 Teachers around the world ★







bubble sort











This is CS50 UTEPSA 2016



This is CS50 *Nicaragua*

Fundación Uno





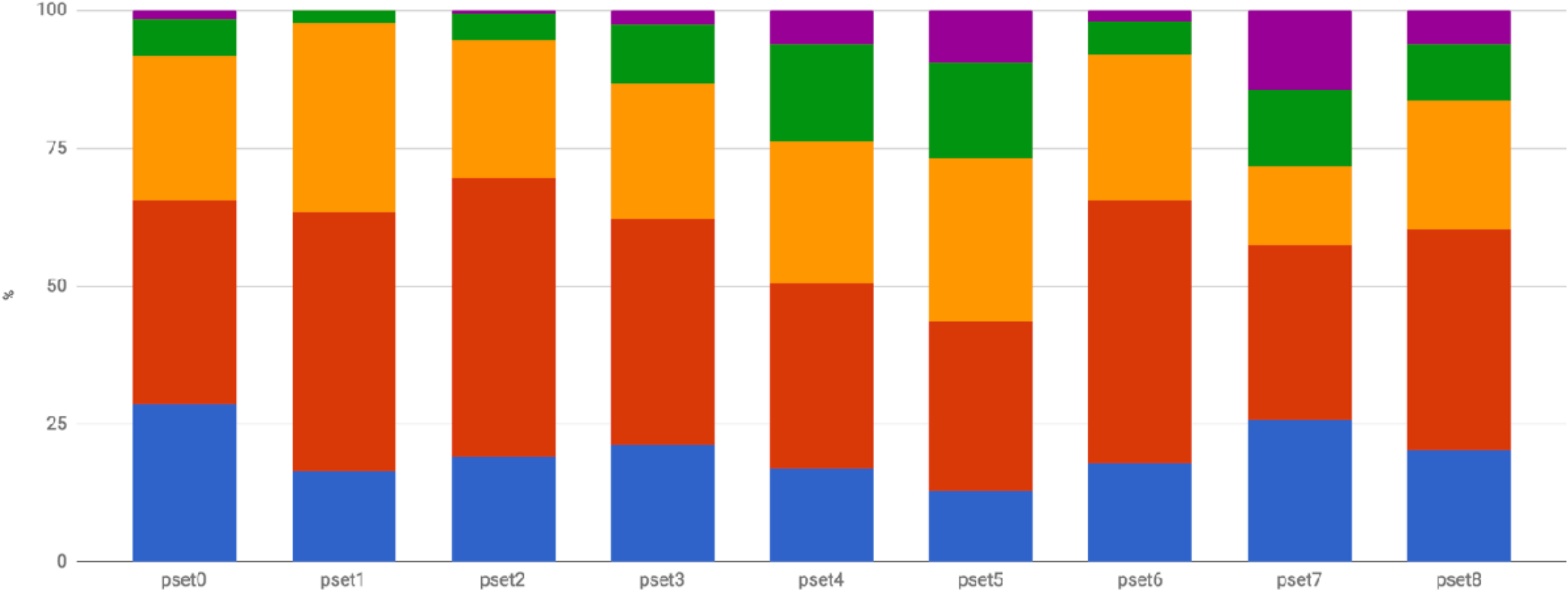


cs50.harvard.edu/apply

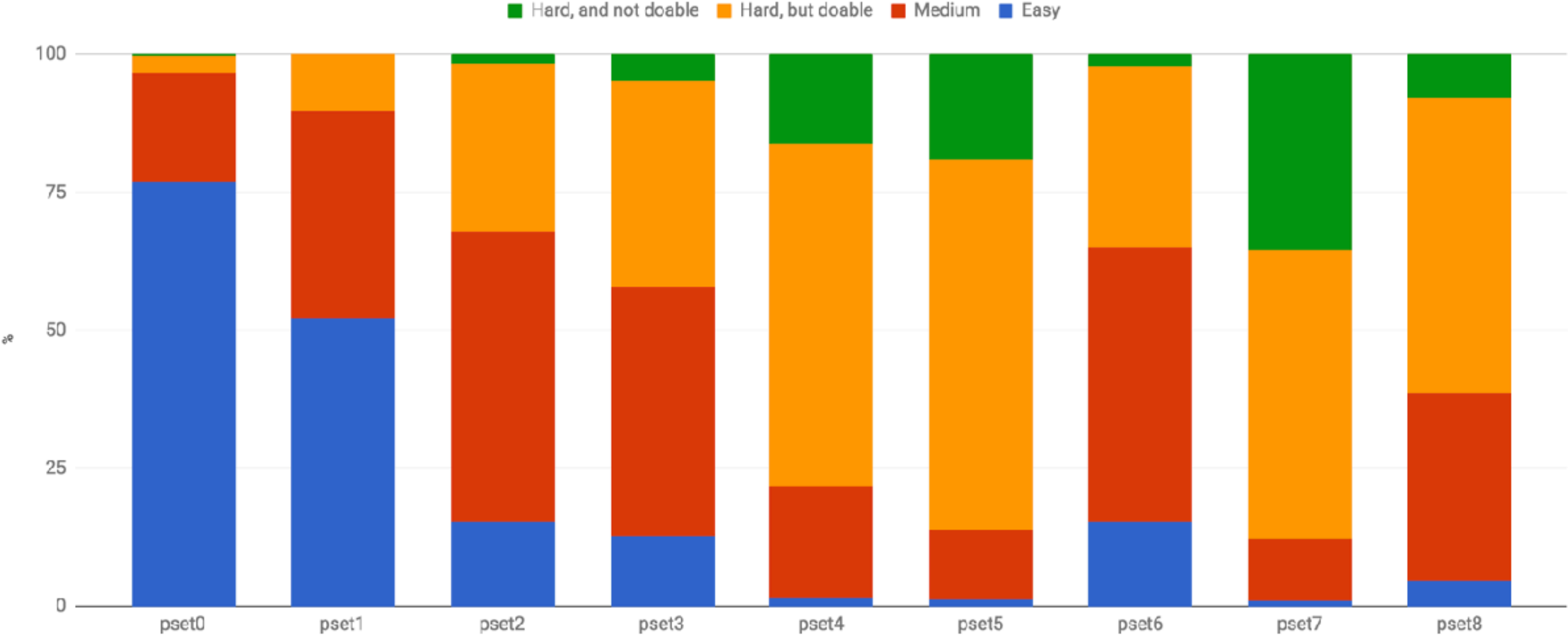
problem solving

What did you think of problem sets?

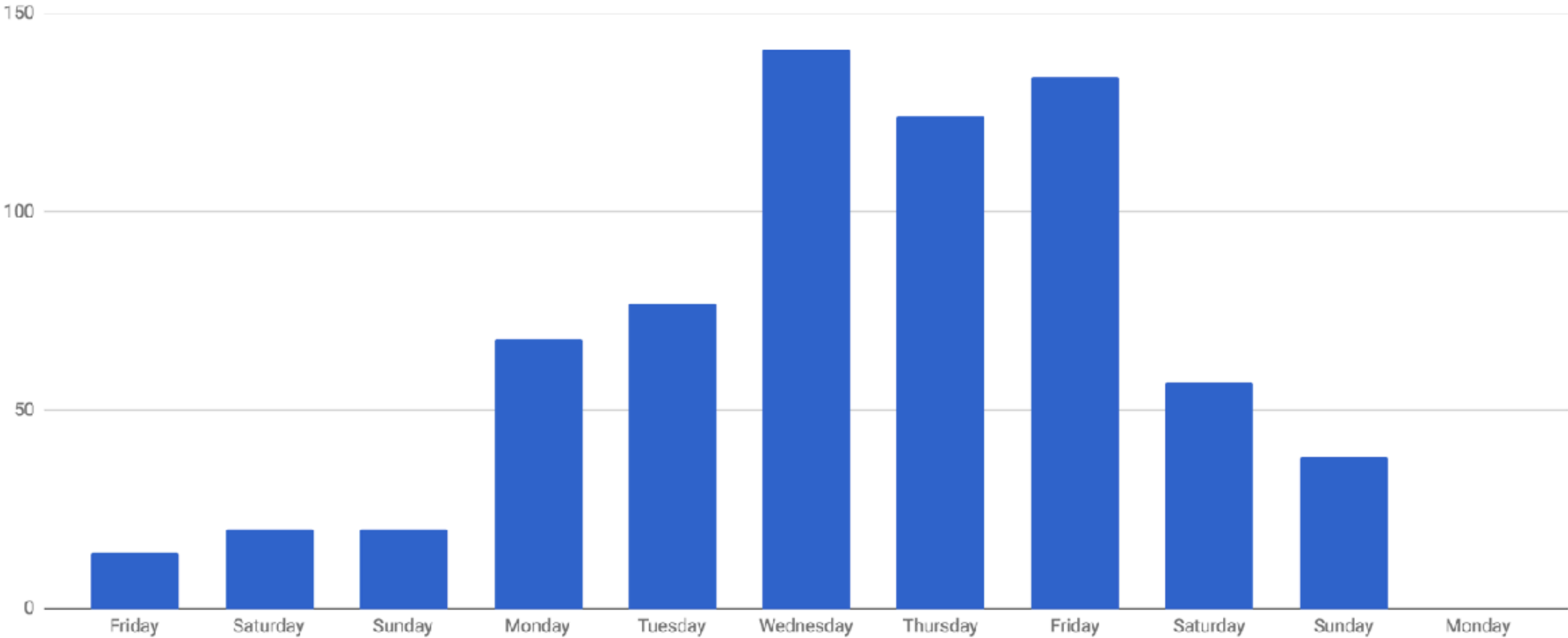
Hate Dislike Neutral Like Love



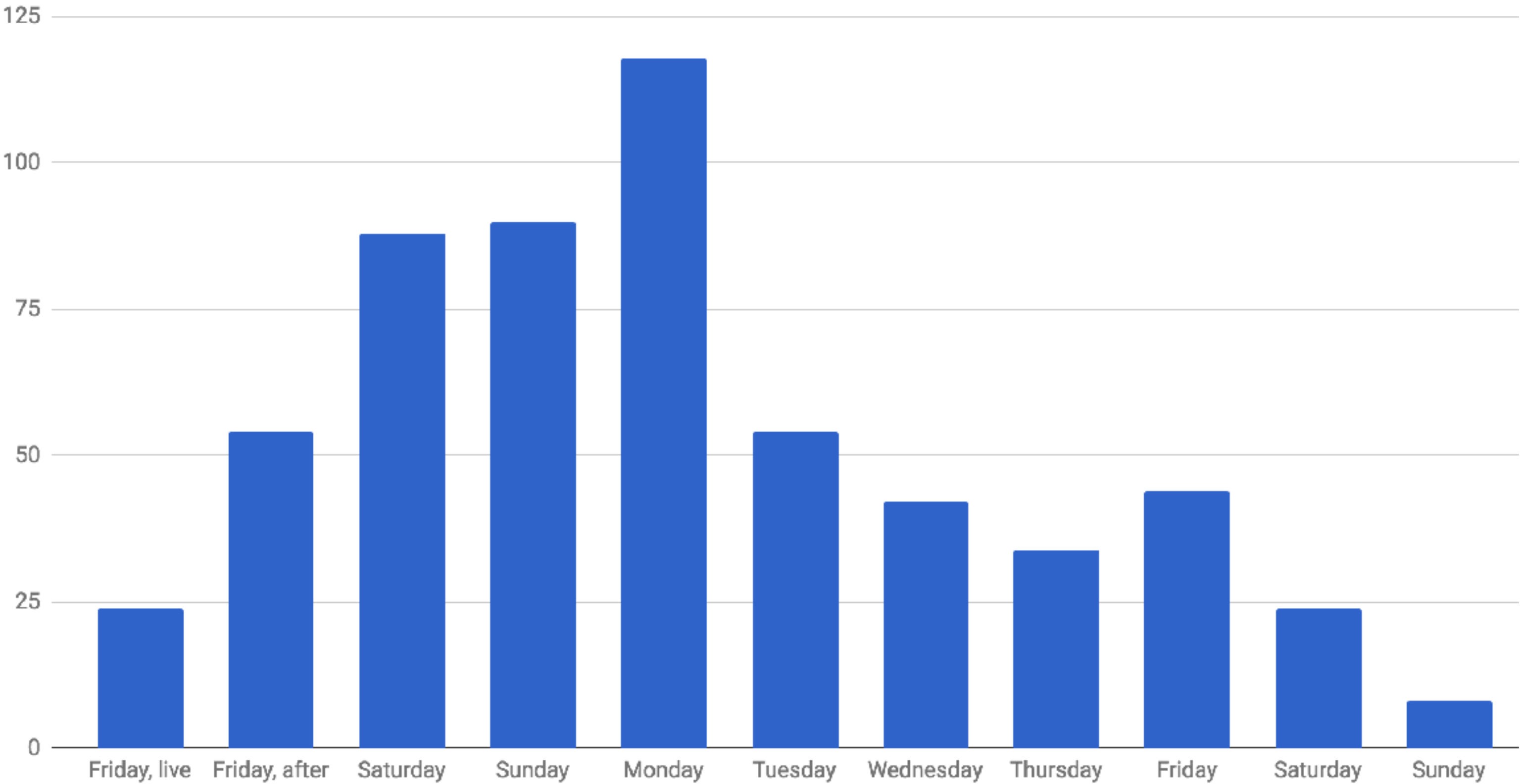
How difficult were problem sets?



When did you start problem sets?

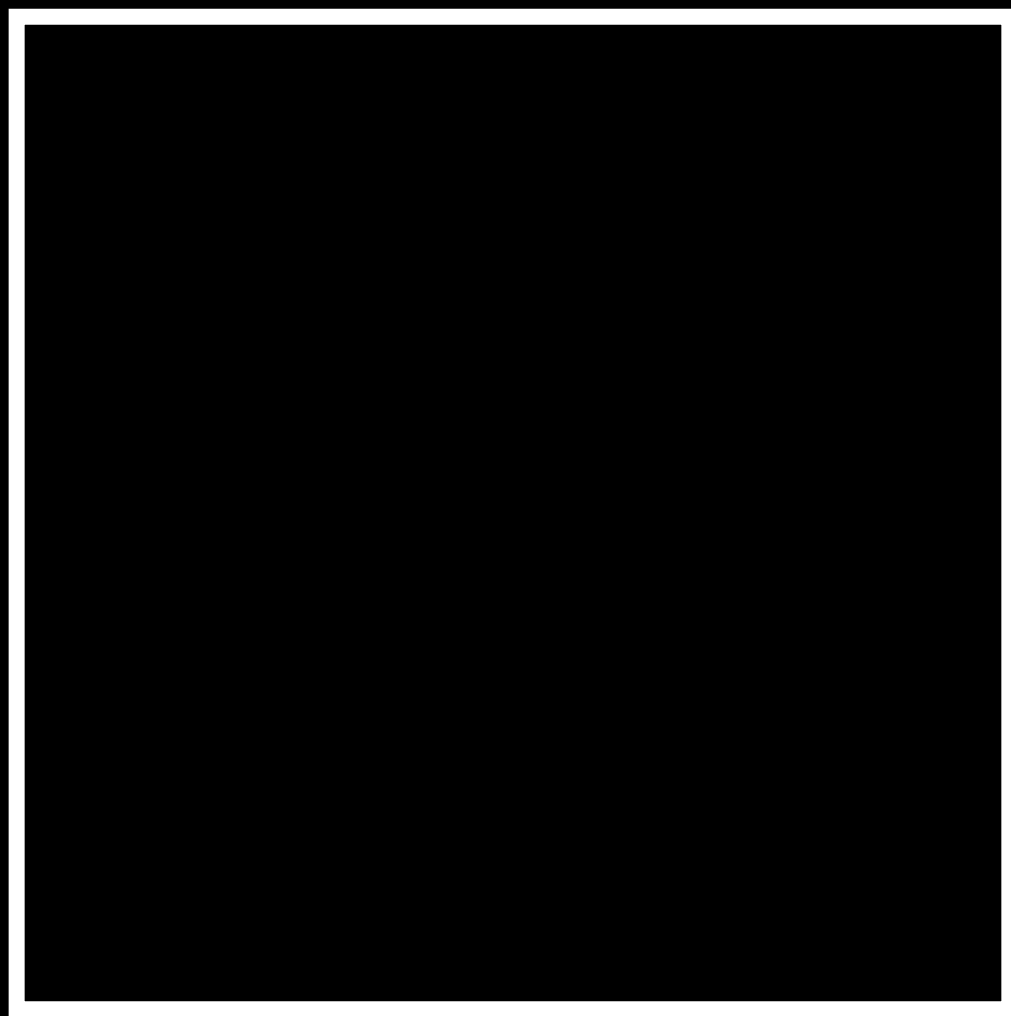


When did you watch lectures?



problem solving

inputs →

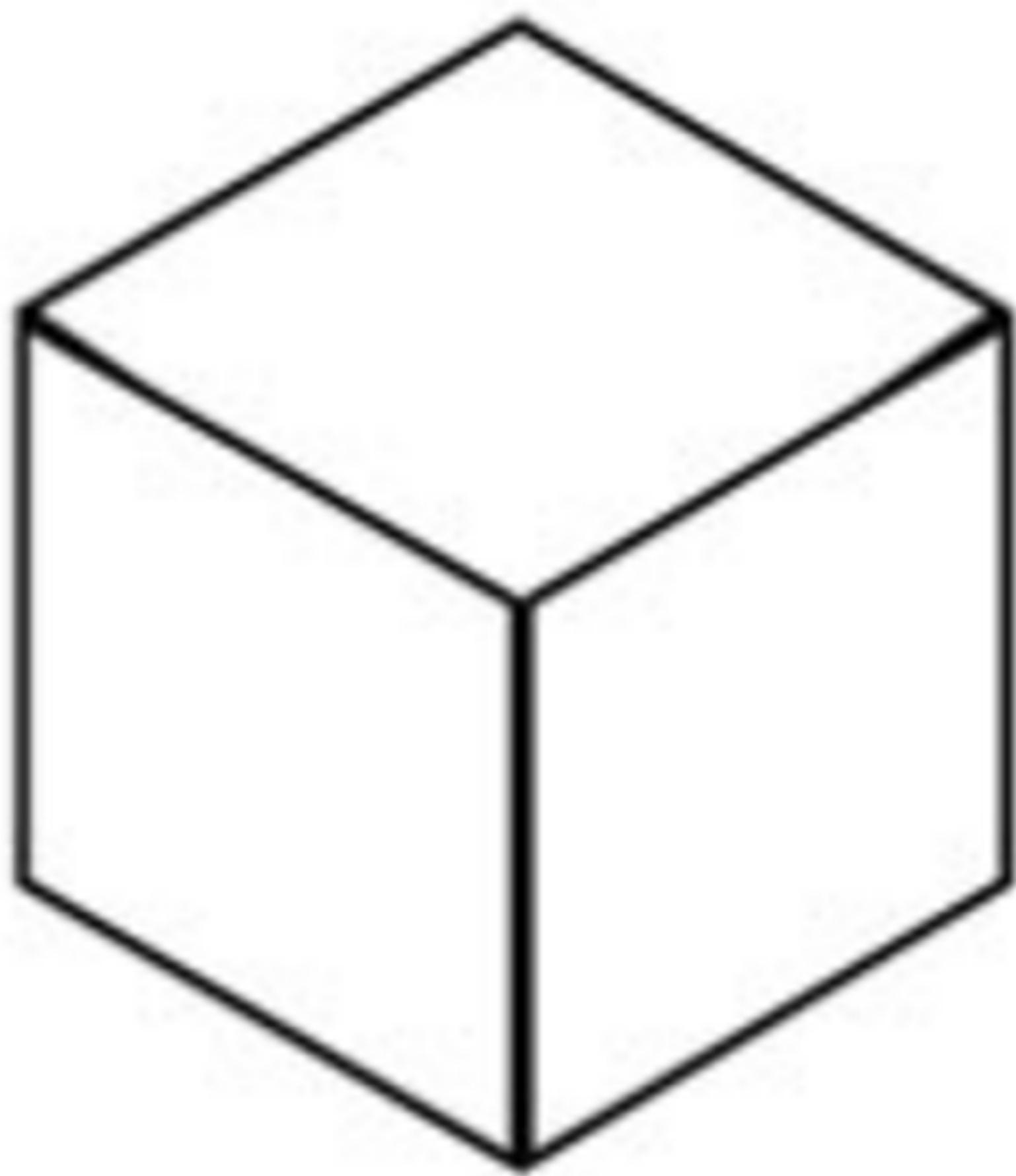


→ outputs

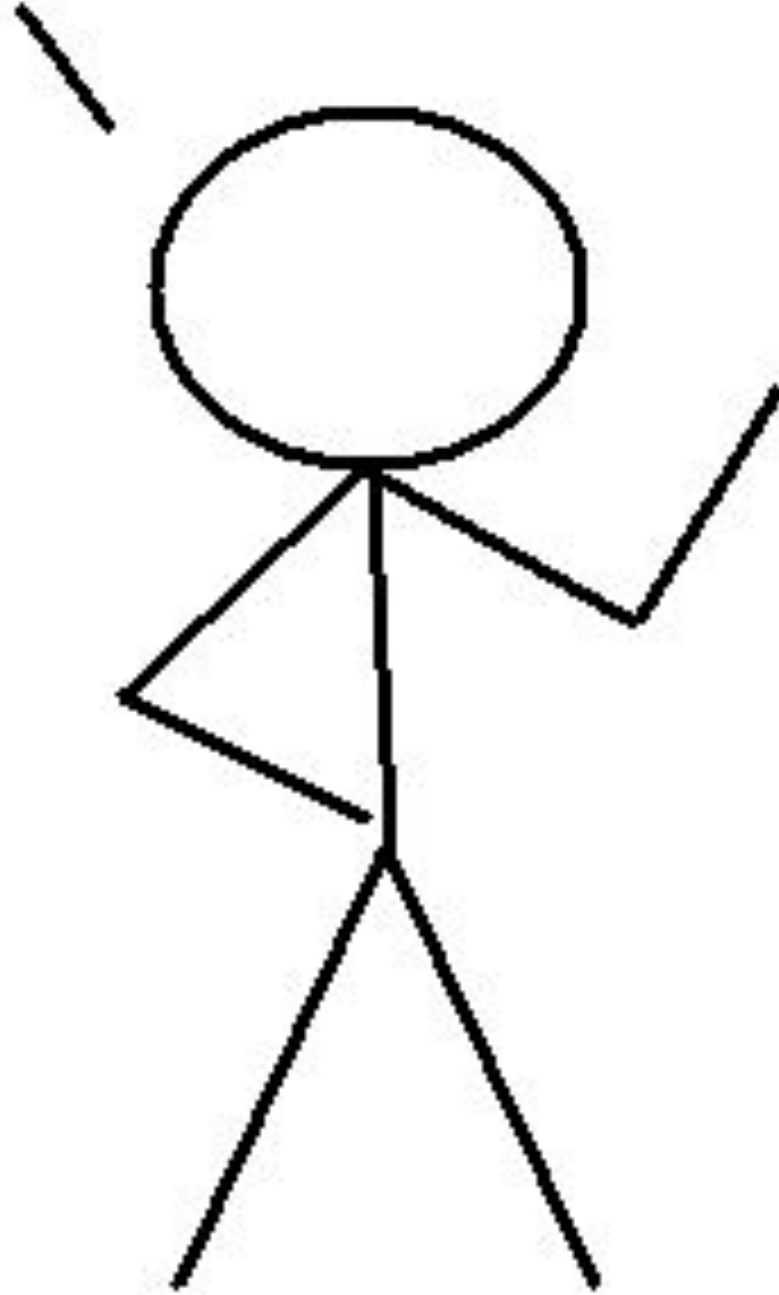
algorithms

abstraction

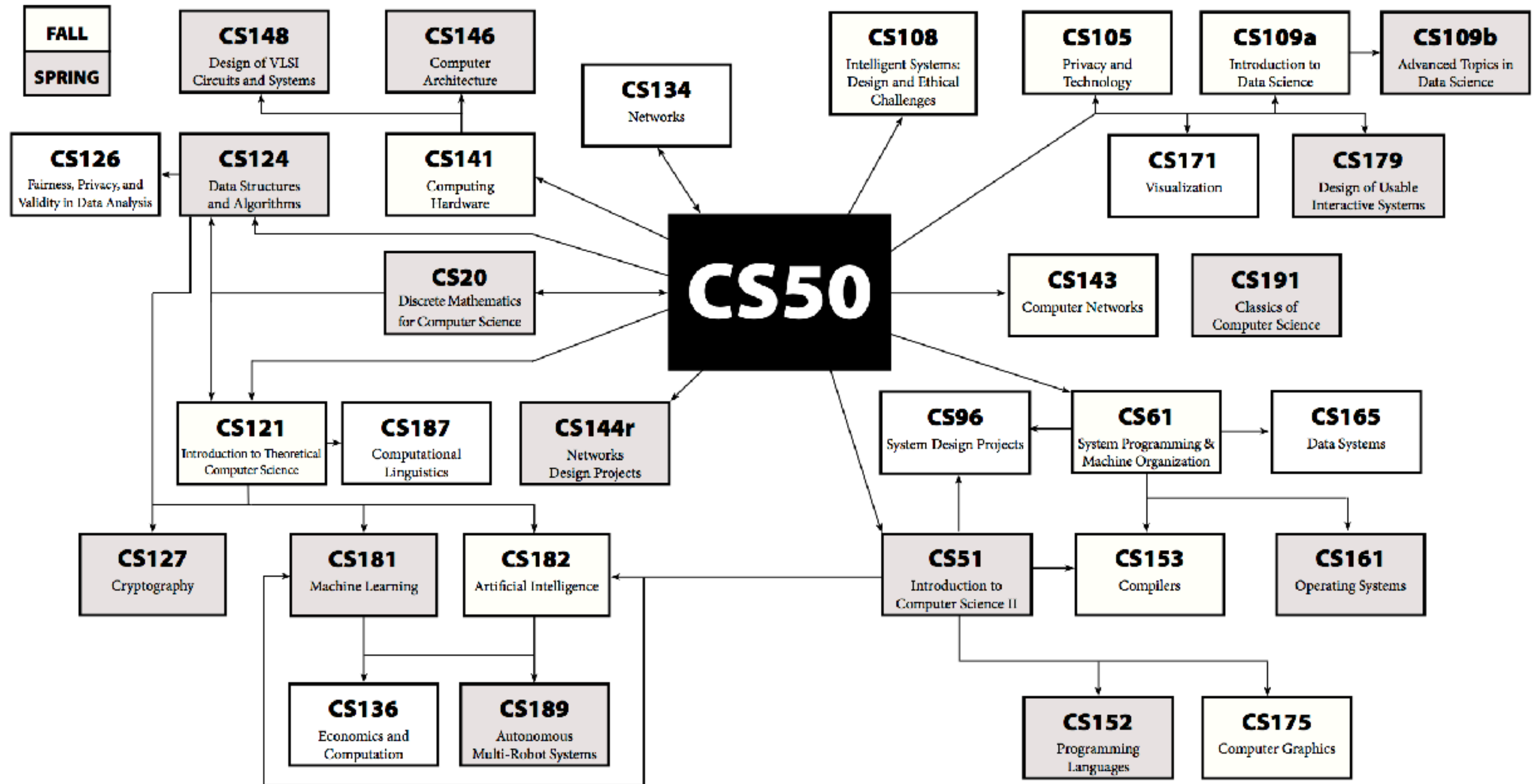
pseudocode



Hi



Life after CS50



Install command-line tools

<https://developer.apple.com/xcode/>

Install command-line tools

<https://msdn.microsoft.com/en-us/commandline/wsl/about>

Learn git

https://youtu.be/MJUJ4wbFm_A

Git?

people.

the original.



Sign up for free private repos

https://education.github.com/discount_requests/new

Which best describes you? 

☒ **Student**

☐ **Teacher**

☐ **Researcher**

☐ **Administrator/staff**

☐ **Other**

What are you looking to get a discount for? 

☒ **Individual account**

☐ **Organization account**

Next

Install git on your own Mac or PC

<https://help.github.com/articles/set-up-git/>

Try Sublime Text

<https://www.sublimetext.com/>

FOLDERS

- ▼ tensorflow
 - ▶ tensorflow
 - ▶ third_party
 - ▶ tools
 - ▶ util
 - .gitignore
 - ACKNOWLEDGMENTS
 - <> ADOPTERS.md
 - AUTHORS
 - /* BUILD
 - CODEOWNERS
 - <> CONTRIBUTING.md
 - <> ISSUE_TEMPLATE.md
 - LICENSE
 - <> README.md
 - <> RELEASE.md
 - WORKSPACE
 - configure
 - /* models.BUILD
- ▼ sqlite3
 - /* shell.c
 - /* sqlite3.c
 - /* sqlite3.h
 - /* sqlite3ext.h

base64.cc

```
34
35 void base64_encode(const uint8_t * data, size_t len, char * dst,
36                   base64_charset variant)
37 {
38     const char * charset = (variant == base64_charset::URL_SAFE)
39         ? URL_SAFE_CHARSET
40         : STANDARD_CHARSET;
41
42     size_t src_idx = 0;
43     size_t dst_idx = 0;
44     while (src_idx < len)
45     {
46         uint8_t s0 = data[src_idx];
47         uint8_t s1 = data[src_idx + 1];
48         uint8_t s2 = data[src_idx + 2];
49
50         dst[dst_idx + 0] = charset[(s0 & 0xfc) >> 2];
51         dst[dst_idx + 1] = charset[((s0 & 0x03) << 4) | ((s1 & 0xf0) >> 4)];
52         dst[dst_idx + 2] = charset[((s1 & 0x0f) << 2) | (s2 & 0xc0) >> 6];
53         dst[dst_idx + 3] = charset[(s2 & 0x3f)];
54     }
55
56     if (src_idx < len)
57     {
58         uint8_t s0 = data[src_idx];
59         uint8_t s1 = (src_idx + 1 < len) ? data[src_idx + 1] : 0;
60
61         dst[dst_idx++] = charset[(s0 & 0xfc) >> 2];
62         dst[dst_idx++] = charset[((s0 & 0x03) << 4) | ((s1 & 0xf0) >> 4)];
63         if (src_idx + 1 < len)
64             dst[dst_idx++] = charset[((s1 & 0x0f) << 2)];
65     }
66
67     dst[dst_idx] = '\0';
68 }
69
```

Use Multiple Selections to rename variables quickly

Try Atom

<https://atom.io/>

- atom
 - .git
 - .github
 - apm
 - benchmarks
 - docs
 - dot-atom
 - electron
 - exports
 - keymaps
 - menus
 - nade_modules
 - out
 - resources
 - script
 - spec
 - src

```
272
273   getComponent () {
274     if (!this.component) {
275       this.component = new TextEditorComponent({
276         element: this,
277         mini: this.hasAttribute('mini'),
278         updatedSynchronously: this.updatedSynchronously
279       })
280       this.updateModelFromAttributes()
281     }
282
283     return this.component
284   }
285 }
286
287 module.exports =
288 document.registerElement('atom-text-editor', {
289   prototype: TextEditorElement.prototype
290 })
291
```


Try vim

<http://valloric.github.io/YouCompleteMe/>

```

int LongestCommonSubsequenceLength( const std::string &first,
                                     const std::string &second ) {
    const std::string &longer = first.size() > second.size() ? first : second;
    const std::string &shorter = first.size() > second.size() ? second : first;

    int longer_len = longer.size();
    int shorter_len = shorter.size();

    std::vector<int> previous( shorter_len + 1, 0 );
    std::vector<int> current( shorter_len + 1, 0 );

    for ( int i = 0; i < longer_len; ++i ) {
        for ( int j = 0; j < shorter_len; ++j ) {
            if ( toupper( longer[ i ] ) == toupper( shorter[ j ] ) )
                current[ j + 1 ] = previous[ j ] + 1;
            else
                current[ j + 1 ] = std::max( current[ j ], previous[ j + 1 ] );
        }

        for ( int j = 0; j < shorter_len; ++j ) {
            previous[ j + 1 ] = current[ j + 1 ];
        }
    }

    return current[ shorter_len ];
}

```


Host a web app

<https://cs50.io/>

Share this workspace



Links to share

Editor:

<https://ide.cs50.io/username/ide50>

☐ Public

Application:

<https://ide50-username.cs50.io>

☒ Public

Files:

<https://preview.cs50.io/username/ide50>

☐ Public

Who has access

▼ Read+Write

 You

RW

☐ Don't allow members to save their tab state

Invite People

username or email

Invite

☒ Notify people via email

☐ R ☒ RW

Done

Share this workspace



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<https://ide.cs50.io/username/ide50>

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Public

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☐ Public

Who has access

▼ Read+Write

● You

RW

☐ Don't allow members to save their tab state

Invite People

username or email

Invite

☒ Notify people via email

☐ R ☒ RW

Done

Host a web app

<https://www.heroku.com/platform>

Host a web app

<http://awseducate.com/>

Get a domain

<https://nc.me/>

Get student developer pack

<https://education.github.com/pack>

Wat

@garybernhardt

CS50 Hackathon





















THIS IS CS50

HARVARD

36443



WELCOME

Want IHOP favorites?
call ahead we'll
have it ready to go
617 787-0533

ihop
'n go
CARRY OUT

CS50 Fair



















THE GAME



CS50



The image features the word "JEOPARDY!" in a large, bold, white, three-dimensional sans-serif font. The letters are set against a dark, textured background. Above the text, there are several glowing, translucent blue and purple rectangular blocks of varying sizes, some of which appear to be floating or falling. The scene is illuminated by vibrant blue and purple neon light streaks and beams that create a sense of depth and movement. The overall aesthetic is futuristic and high-tech, reminiscent of a digital or virtual game show set.

JEOPARDY!

The image features the word "JEOPARDY!" in a large, bold, white, three-dimensional sans-serif font. The letters are set against a dark, textured background. Above the text, there are several horizontal, translucent blue rectangular blocks of varying lengths, some of which are slightly offset, creating a sense of depth. A bright blue horizontal line of light passes through the center of the image, behind the text. Below the text, there are more blue rectangular blocks, some of which are also offset. The overall lighting is a mix of blue and purple, with a strong blue glow emanating from the bottom and sides, suggesting a futuristic or high-tech environment. The text itself has a slight blue glow on its right side.

JEOPARDY!

1879 Tie 0-0

1942 Yale 23-0

1923 Yale 16-C

1907. Y. le 12.

1965 Yale 6-

1907 Yale 12

1908 Harvard

909 Yale

1910 Tie 0-0

and 1905

0-17-0

Card 10-6

CS50

