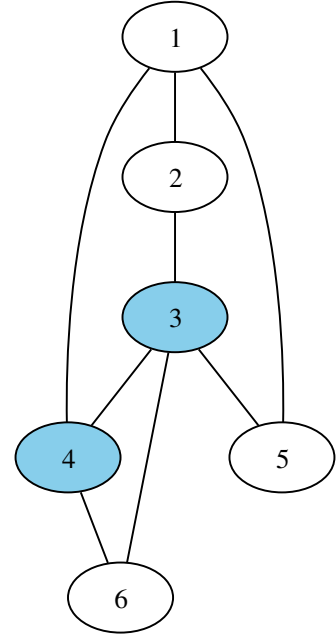
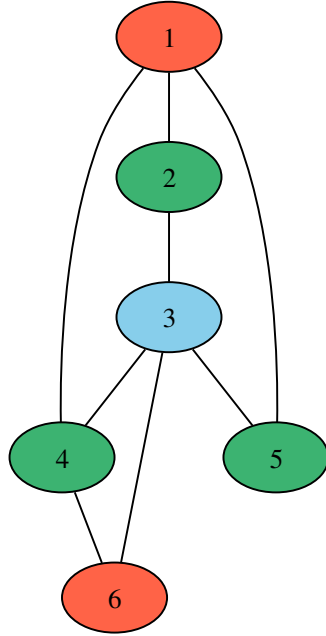
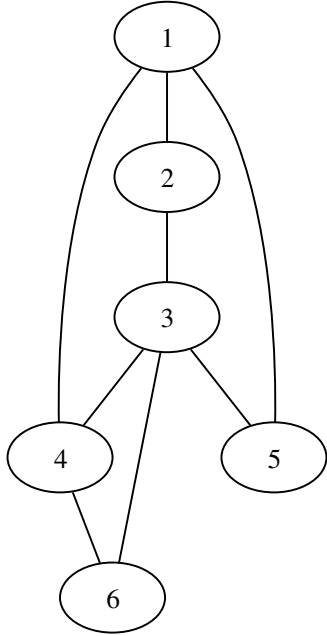


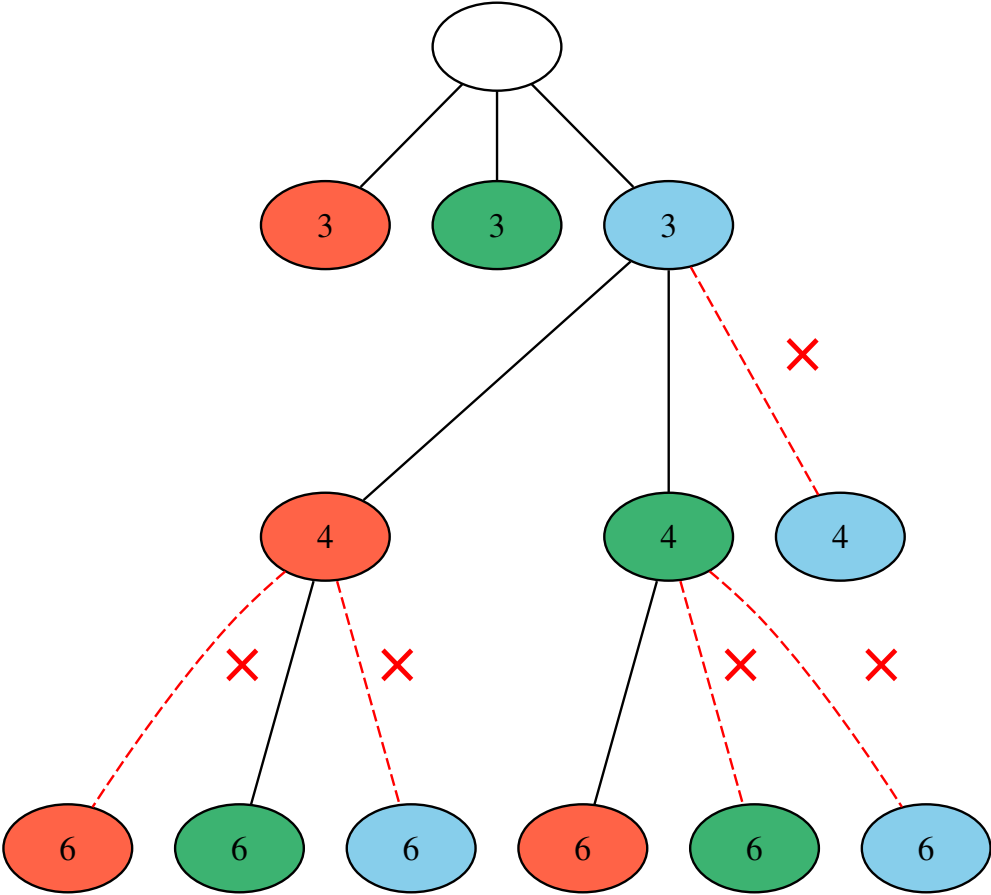
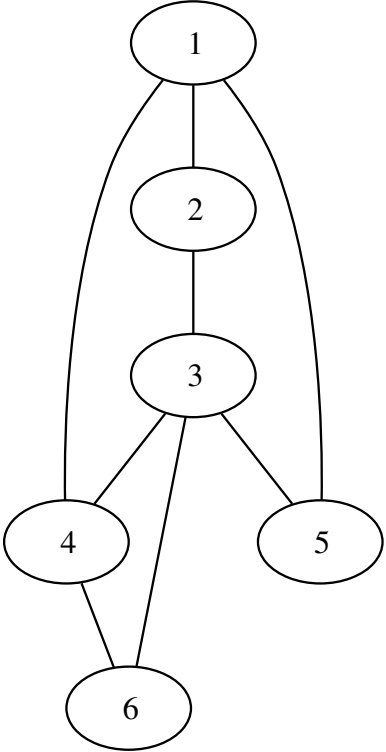
Graph 3-coloring in Forth

Andrey Proskurin (12122381)

Graph Coloring

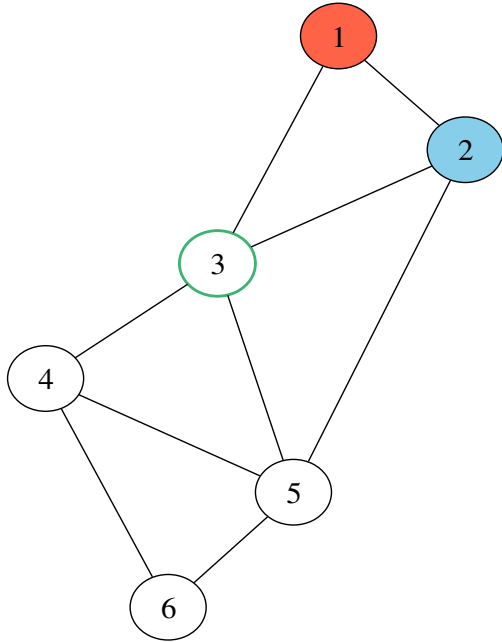


Backtracking

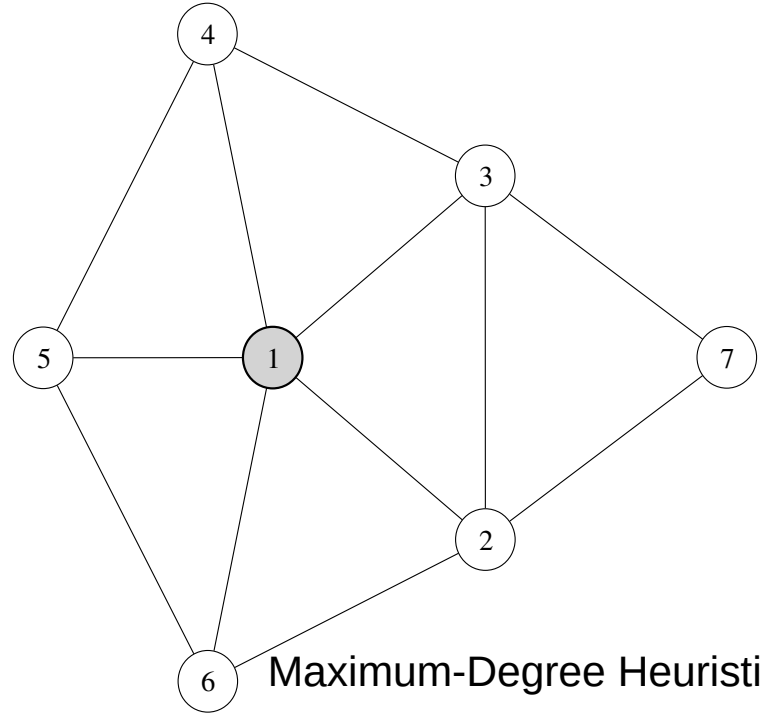


Heuristics

- Order of node selection has a huge impact on the backtracking runtime.
- Use Binary Heap to efficiently extract next node with the best heuristic value.



Minimum-Remaining-Values Heuristic



Maximum-Degree Heuristic 4 / 6

Benchmarks

Graph	Naive	Heuristics
random_80_283 (neg)	1m 4s	29 ms
random_140_217 (pos)	> 1 Hour	70 ms

Forth-specific language features

- Using parsing words to read Dimacs files

```
: c postpone \ ;  
: e parse-name s>number parse-name s>number ( ... ) ;
```

- Foreach neighbor macro

```
: foreach-neighbor ( node -- )  
  [] cells edges + $@ bounds +do [  
; immediate  
  
: end-foreach ( -- )  
  [] cell +loop [  
; immediate
```

- Using the Return Stack