Aufgabenblatt 3

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Aufgabe 1

a)

Ausdruck	Wert
`int x = 49;`	–
`!(x >= 0 && x < 50 || x > 50 && x <= 100)`	`false`
`x++ == 49 || x-- == 49`	`true`
`!(x >= 0 && x < 50 || x > 50 && x <= 100)`	`true`
`int k; scanf("%d", &k);`	–
`!(k > 0 && k%10 <= 7) == (!(k > 0) || !(k%10 <= 7))` $\neg(k > 0 \wedge k (mod\ 10) \leq 7) = (\neg(k > 0) \vee \neg(k (mod\ 10) \leq 7))$ Definiere $P := k > 0$ und $Q := k (mod\ 10) \leq 7$. Dann gilt: $\neg(P \wedge Q) \Leftrightarrow \neg P \vee \neg Q$, weil es laut den De Morganschen Gesetzen äquivalent ist.	`true`

b)

```
1) !(m > 10) && (n != 0)

2) (x > 0) && (y > 0) && (z > 0) && (x % 5 == 0) && (y % 5 == 0) && (z % 5
    == 0)

3) (a >= 1 && a <= 10) || (a < -7)

4) 1 < 3
```

Aufgabe 2

```c
#include <stdio.h>
#include <stdbool.h>
#include <stdlib.h>

struct station
{
  int line;
  int stop;
};

struct trip
{
  struct station start;
  struct station end;
};

bool compare_stations(struct trip t, struct station s1, struct station s2)
{
  return (t.start.line == s1.line && t.start.stop == s1.stop && t.end.line
      == s2.line && t.end.stop == s2.stop) ||
```

```
20            (t.start.line == s2.line && t.start.stop == s2.stop && t.end.line
                  == s1.line && t.end.stop == s1.stop);
21  }
22
23  bool is_short_trip(struct trip t)
24  {
25    if (compare_stations(t, (struct station){5, 2}, (struct station){4, 2}) ||
26        compare_stations(t, (struct station){0, 0}, (struct station){2, 1}))
27      return false;
28
29    if (abs(t.start.stop - t.end.stop) == 1 &&
30        (t.start.line == t.end.line ||
31          t.start.line == 0 || t.end.line == 0))
32      return true;
33
34    if (abs(t.start.line % 5 - t.end.line % 5) == 1 &&
35        t.start.stop == 2 && t.end.stop == 2)
36      return true;
37
38    return false;
39  }
40
41  int count_zone_crosses(struct trip t)
42  {
43    if (t.start.stop > 2 && t.end.stop > 2 && t.start.line != t.end.line)
44      return 2;
45    if ((t.start.stop > 2 && t.end.stop < 3) || (t.start.stop < 3 && t.end.
        stop > 2))
46      return 1;
47
48    return 0;
49  }
50
51  int count_end_stops(struct trip t)
52  {
53    return (t.start.stop == 5 ? 1 : 0) + (t.end.stop == 5 ? 1 : 0);
54  }
55
56  bool is_start_equal_to_end(struct trip t)
57  {
58    return t.start.line == t.end.line && t.start.stop == t.end.stop;
59  }
60
61  int main()
62  {
63    int start_input, end_input;
64    printf("Starthaltestelle: ");
65    scanf("%d", &start_input);
66    printf("Zielhaltestelle: ");
67    scanf("%d", &end_input);
68
69    struct trip trip = {
70        {(start_input / 10) % 10, start_input % 10},
71        {(end_input / 10) % 10, end_input % 10}};
72
73    int price = 0;
74    price = is_short_trip(trip) ? 2 : 3;
75    price += count_zone_crosses(trip);
76    price += count_end_stops(trip);
77    price = is_start_equal_to_end(trip) ? 0 : price;
78
79    printf("%d Euro\n", price);
80    return 0;
81  }
```