

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

Mathematics for Computer Science
MIT 6.042J/18.062J

Proof by Cases

Albert R Meyer February 11, 2013 cases.1

6	9	13	7
12		10	5
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Java Logical Expression

if ((x>0) || (x <= 0 && y>100))
OR AND
(more code)

better: if ((x>0) || y>100)
(more code)

Albert R Meyer February 11, 2013 cases.2

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

Case 1: $x > 0$

true
if ((x>0) || (x <= 0 && y>100))
OR AND

true
if ((x>0) || y>100)
OR

so both are true

Albert R Meyer February 11, 2013 cases.3

6	9	13	7
12		10	5
3	1	4	14
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Case 2: $x \leq 0$

false
if ((x>0) || (x <= 0 && y>100))
OR AND

false
if ((x>0) || y>100)
OR

Albert R Meyer February 11, 2013 cases.4

6	9	13	7
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3	1	4	14
15	8	11	2

Case 2: $x \leq 0$

true
if (x <= 0 && y>100)
AND

if (y>100)

Albert R Meyer February 11, 2013 cases.5

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

Case 2: $x \leq 0$

if (y>100)

if (y>100)

so both still the same

Albert R Meyer February 11, 2013 cases.6

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

Proof by Cases

Reasoning by cases can break a complicated problem into easier subproblems.
Some philosophers* think reasoning this way is worrisome.

*intuitionists



Albert R Meyer

February 11, 2013

cases.7

6	9	13	7
12		10	5
3	1	4	14
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\$1,000,000 Question

Is $P = NP$?



Albert R Meyer

February 11, 2013

cases.8

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

\$1,000,000 Question

The answer is on my desk!
(Proof by Cases)



Albert R Meyer

February 11, 2013

cases.9

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