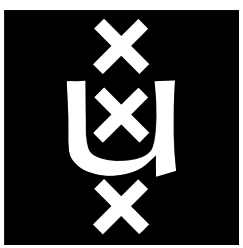
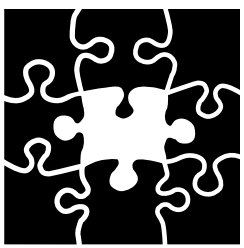
Tutorial Introduction to Neural Networks with an eye towards linguistic applications

Shane Steinert-Threlkeld

January 25, 2019



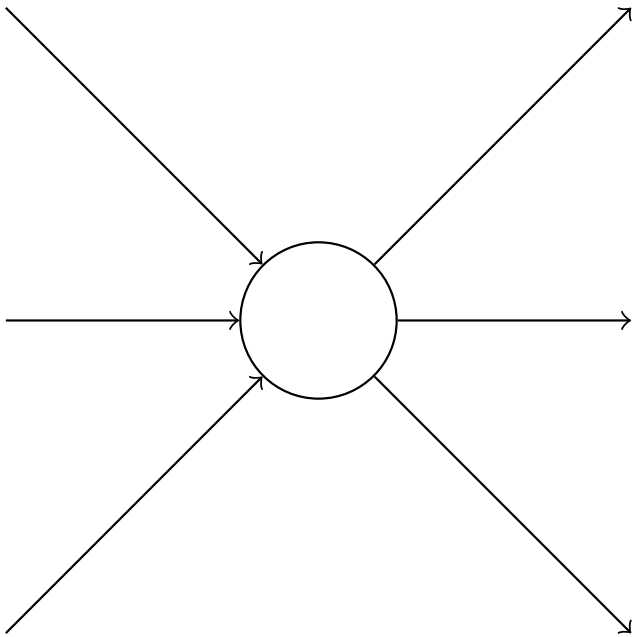


Today's Plan

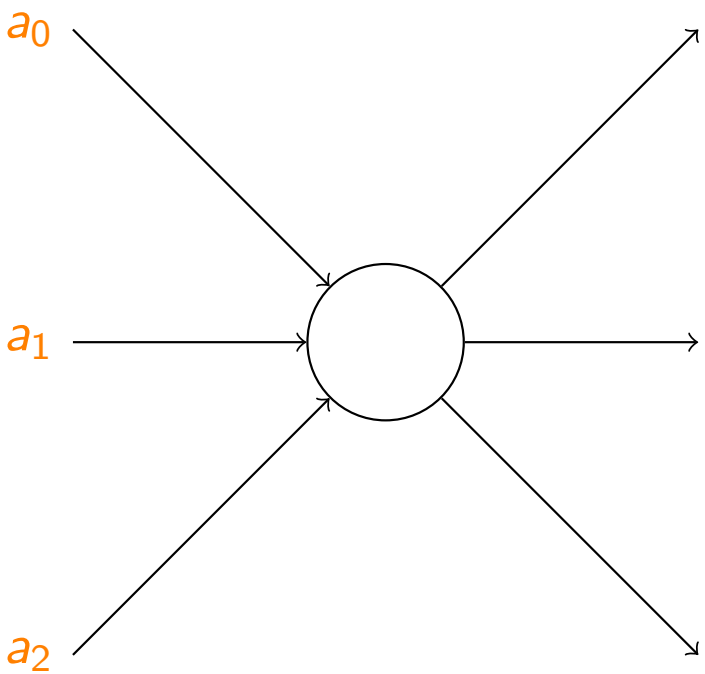
Materials: Slides + Jupyter Notebook

https://github.com/shanest/nn-tutorial

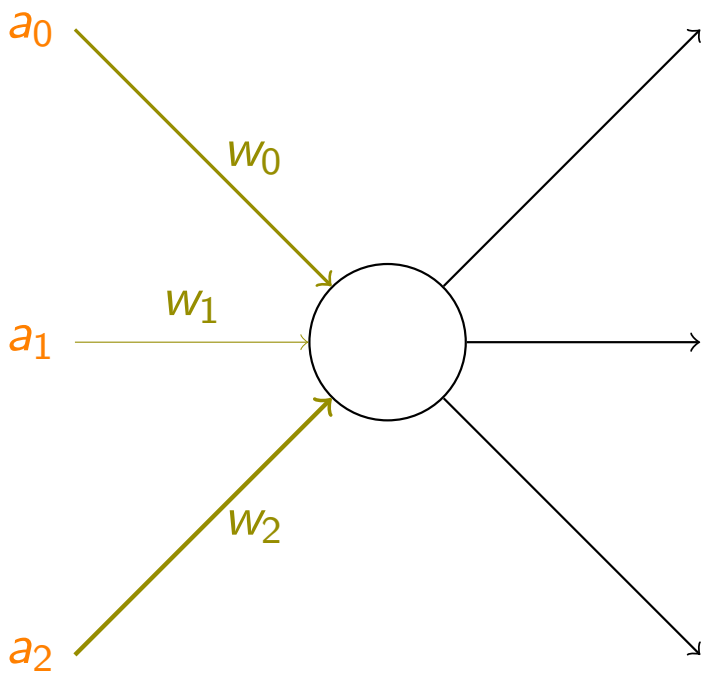
Artificial Neuron



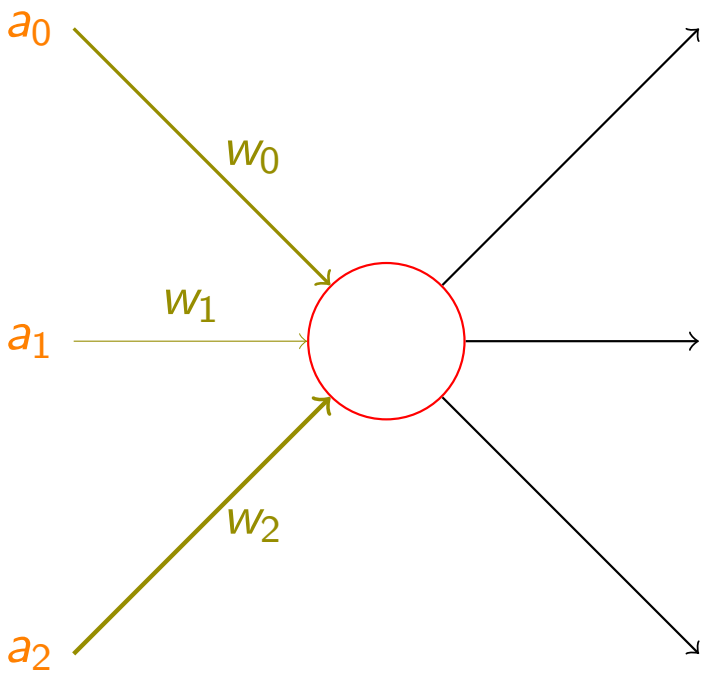
Artificial Neuron



Artificial Neuron

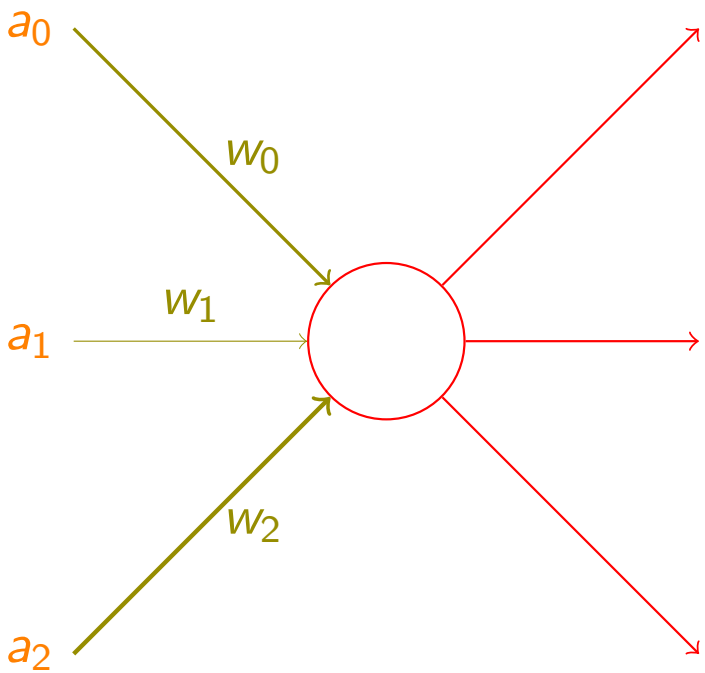


Artificial Neuron



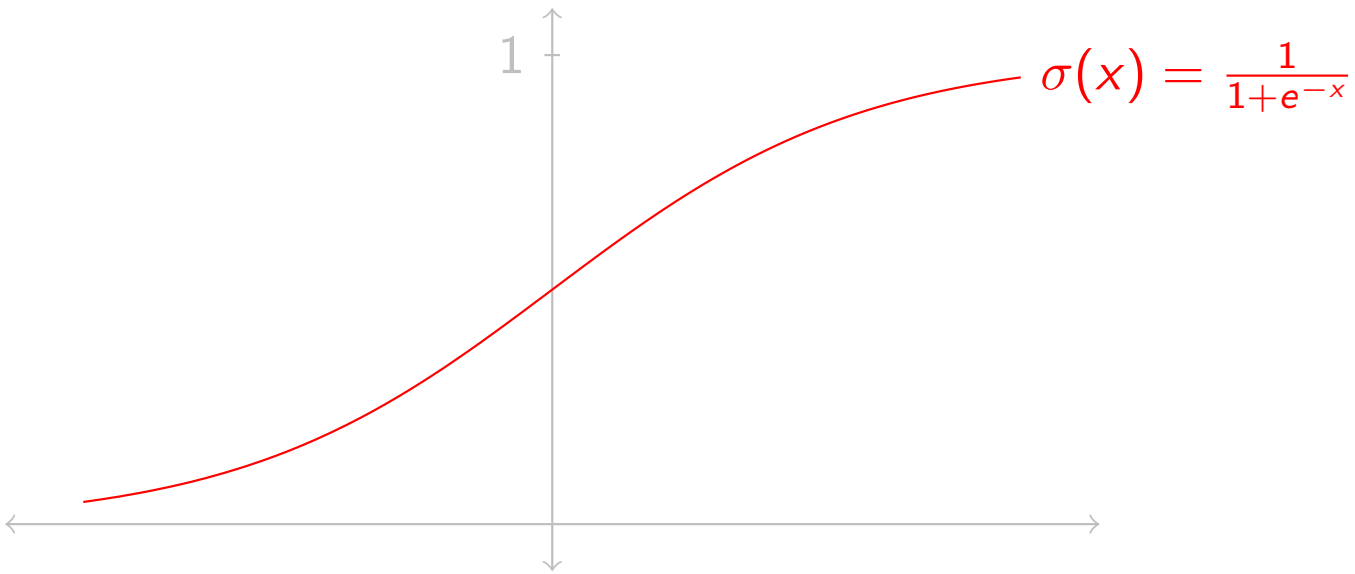
$$a = f(a_0 \cdot w_0 + a_1 \cdot w_1 + a_2 \cdot w_2)$$

Artificial Neuron



$$a = f(a_0 \cdot w_0 + a_1 \cdot w_1 + a_2 \cdot w_2)$$

Activation Function

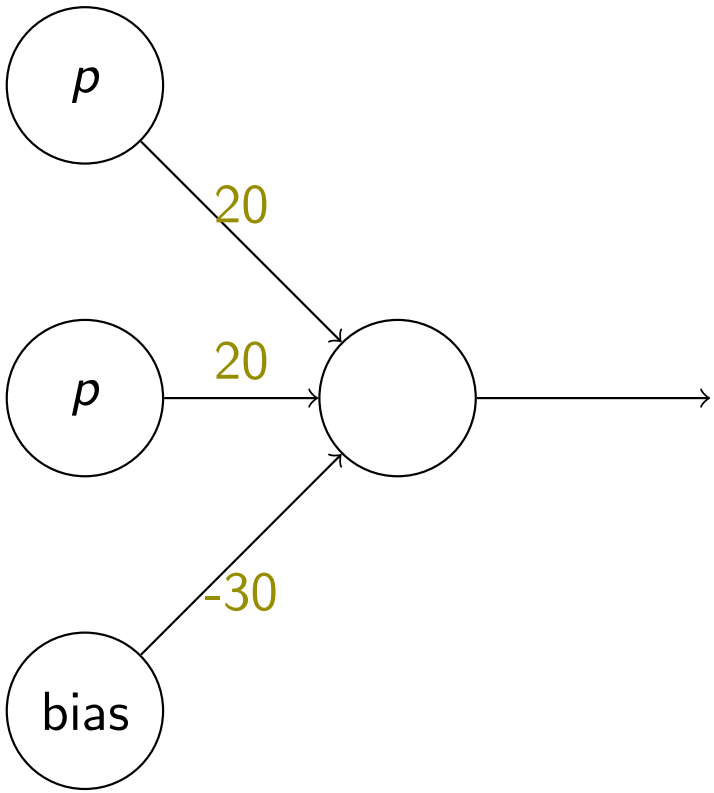


More on choosing activation functions later in the tutorial.

Computing 'and'

p	q	$p \wedge q$
1	1	1
1	0	0
0	1	0
0	0	0

Computing 'and'



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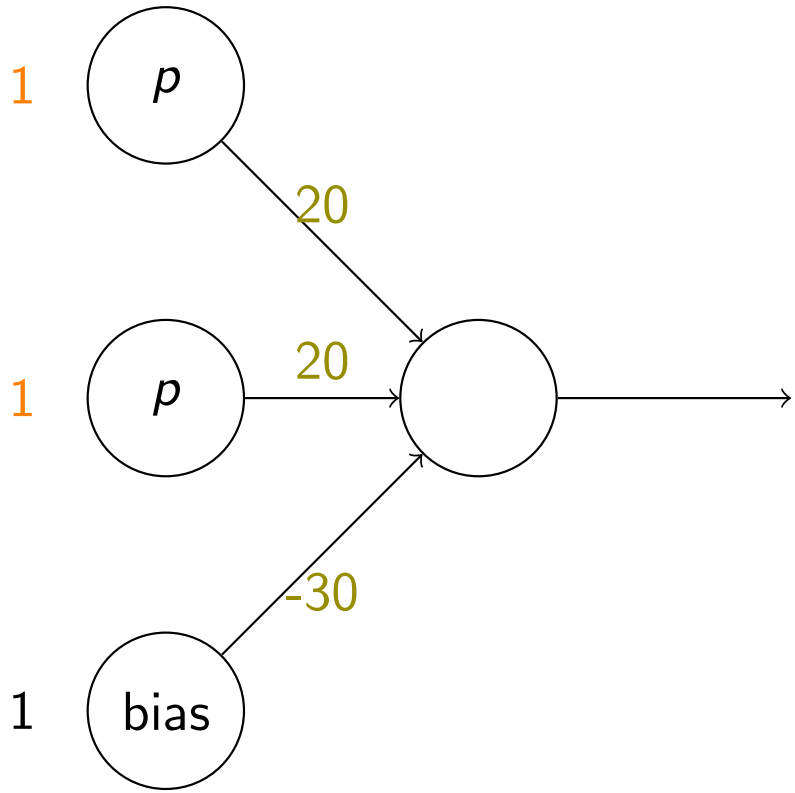
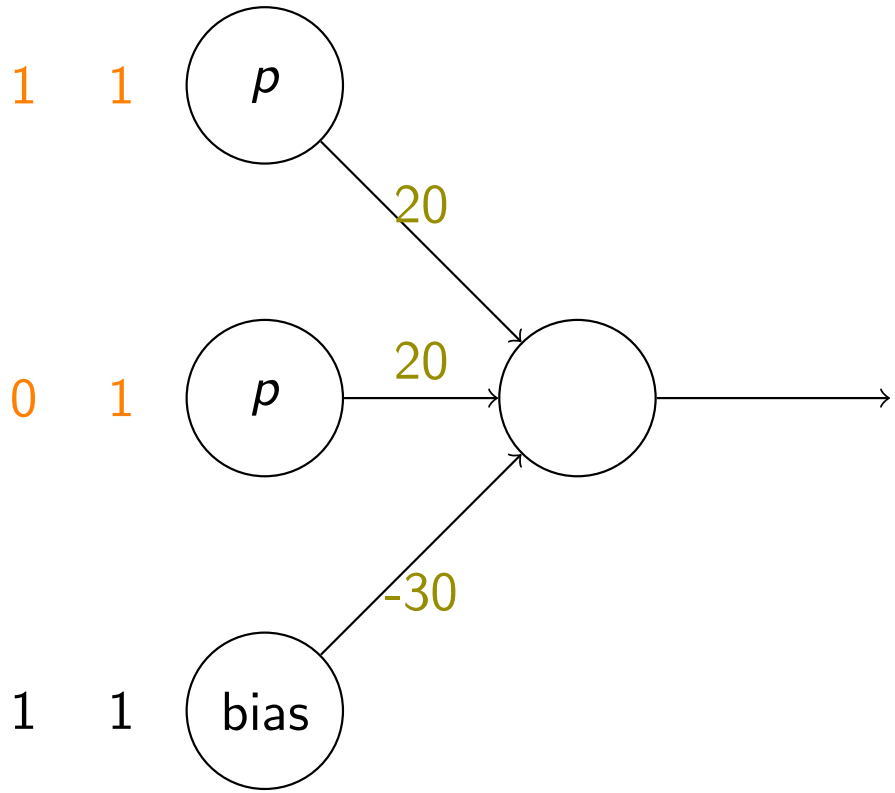


$$a = \sigma(1 \cdot 20 + 1 \cdot 20 + 1 \cdot -30) = \sigma(10) \approx 1$$

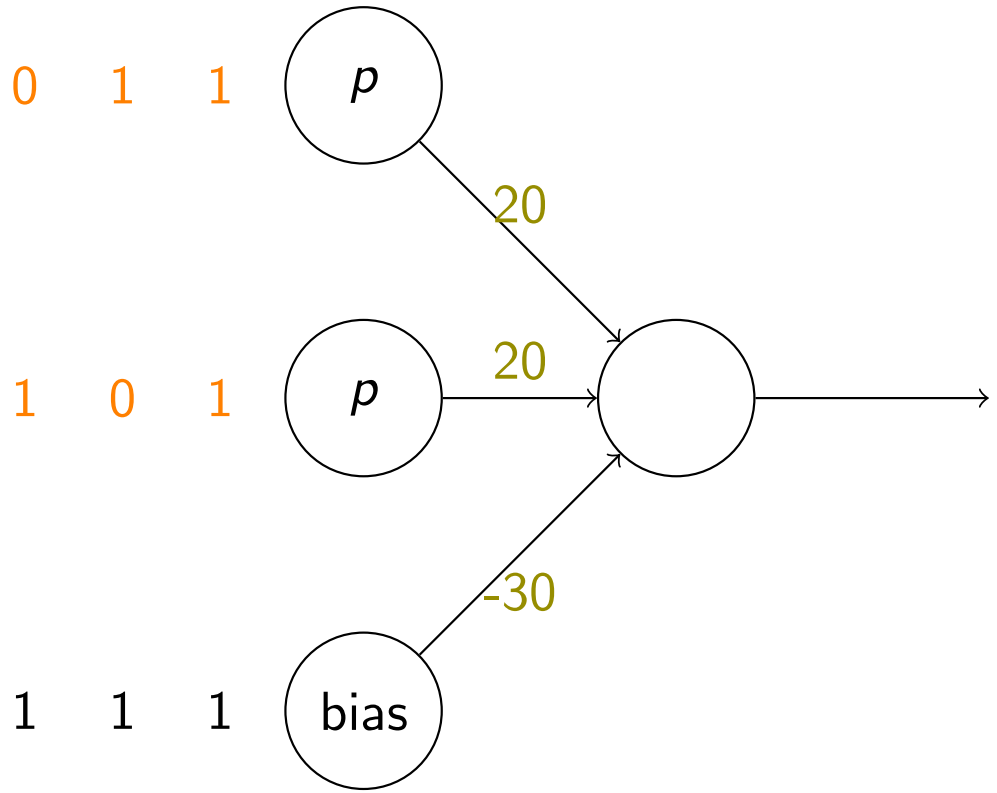
Computing 'and'



$$a = \sigma(1 \cdot 20 + 1 \cdot 20 + 1 \cdot -30) = \sigma(10) \approx 1$$

$$a = \sigma(1 \cdot 20 + 0 \cdot 20 + 1 \cdot -30) = \sigma(-10) \approx 0$$

Computing 'and'



$$a = \sigma(1 \cdot 20 + 1 \cdot 20 + 1 \cdot -30) = \sigma(10) \approx 1$$

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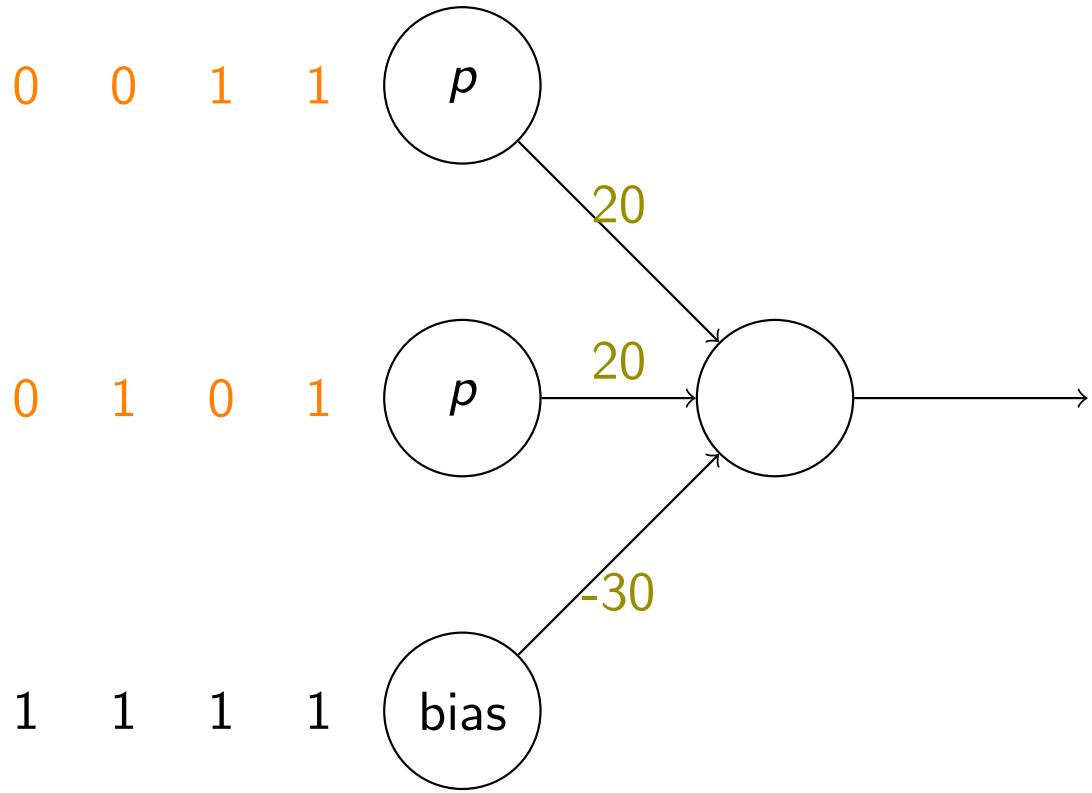
Computing 'and'



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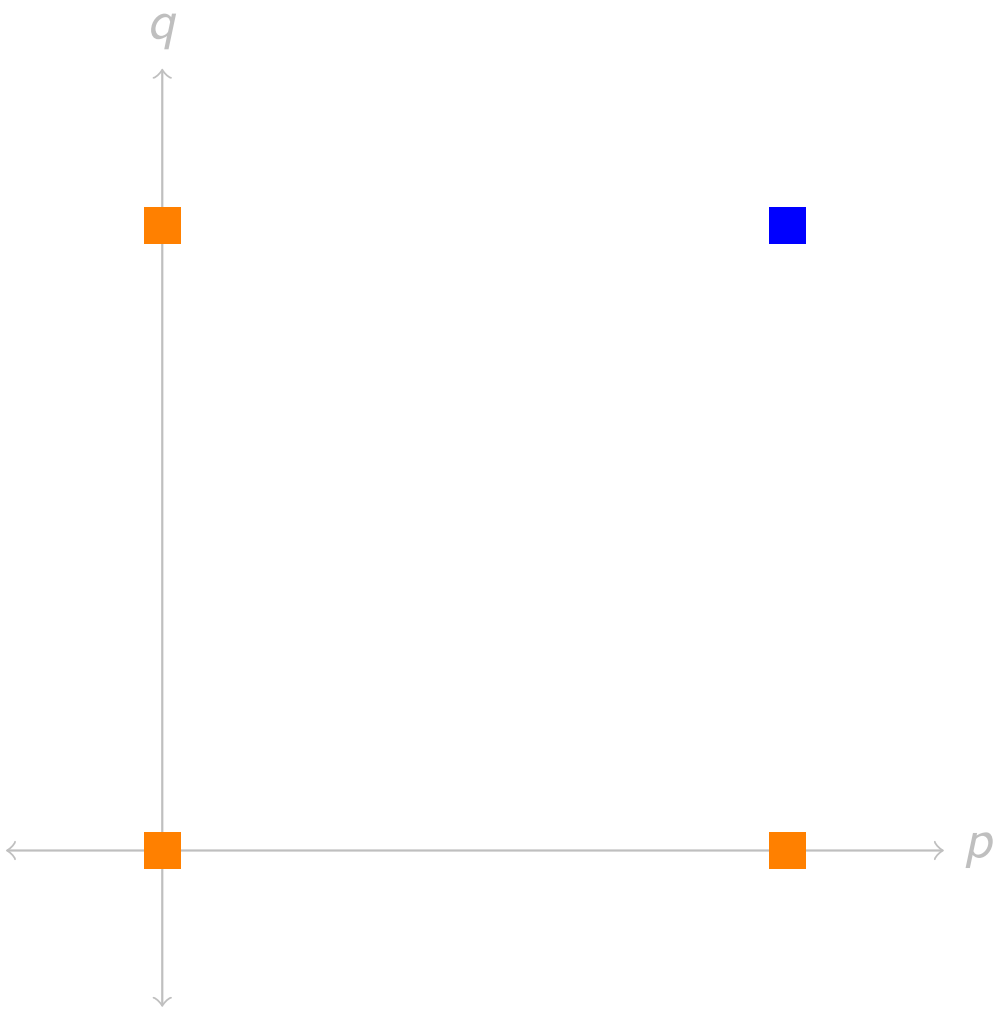

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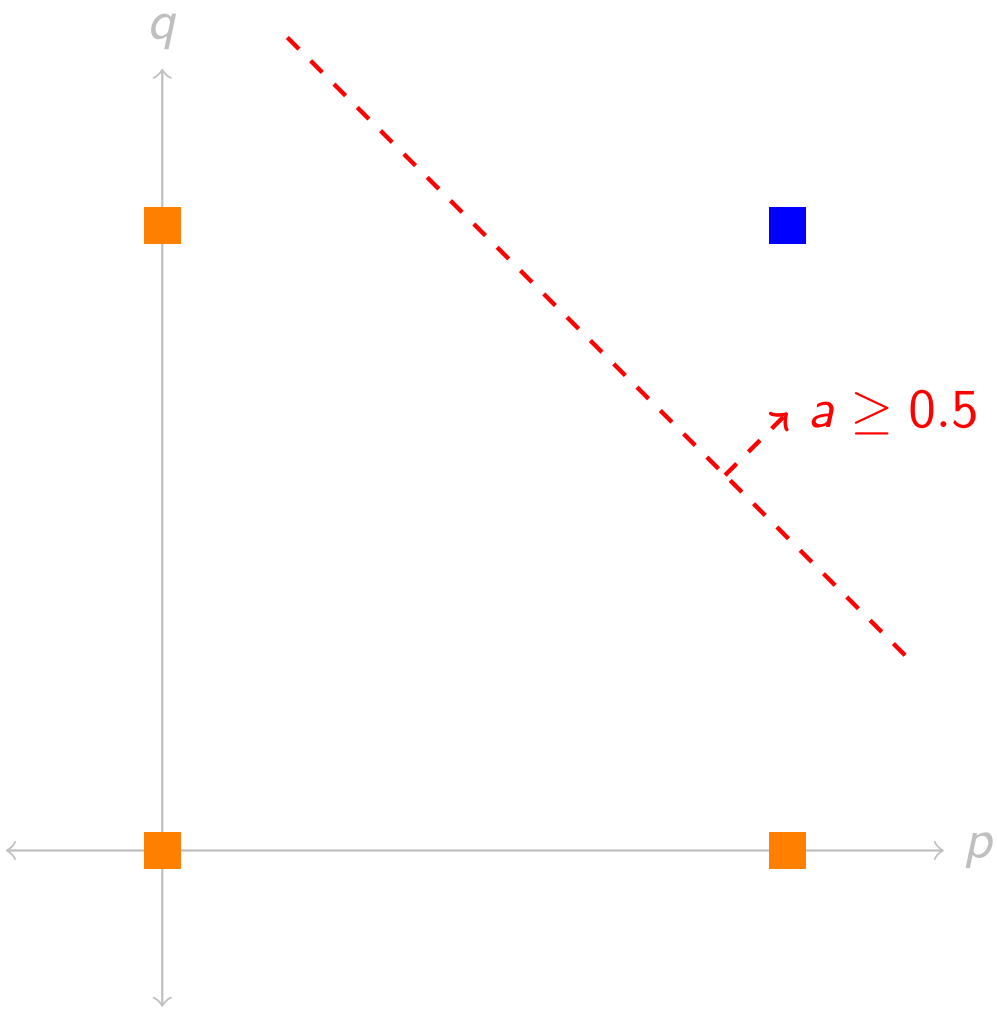

References I