Type A question

Consider the basic ohmic model circuit of the cell membrane in steady-state.
Membrane potential V_m = -30mV
Reversal potential E_K = -90mV
Reversal potential E_{Na} = +50mV
Transmembrane resistances $R_K = R_{Na}$
Reversal potential and transmembrane resistance for chloride E_{Cl}, R_{Cl} unknown.
$| I_{Na} |$ denotes absolute value of the current I_{Na} (non-negative number without directionality)
$| I_K |$ denotes absolute value of the current I_K (non-negative number without directionality)
What is correct?
A) $| I_{Na} | > | I_K |$ and the sodium ions flow inward
B) $| I_{Na} | > | I_K |$ and the sodium ions flow outward
C) $| I_{Na} | < | I_K |$ and the sodium ions flow inward
D) $| I_{Na} | < | I_K |$ and the sodium ions flow outward

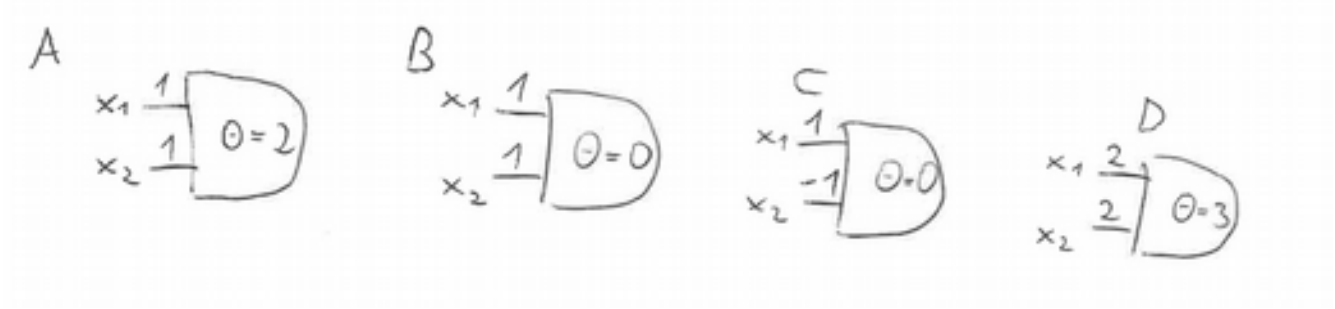
Correct answer: A

Type K' question
Consider an experiment where we keep the intracellular ion concentration of a neuron constant. If we increase the extracellular concentration of which of the following ions, the reversal potential gets more negative?
A) potassium
B) sodium
C) calcium
D) chloride

Correct answer: A false, B false, C false, D true

Type K' question

Which of these four perceptron gates with 2 inputs x_1 and x_2 and threshold θ, giving output 1 if $w_1x_1 + w_2x_2 - \theta \geq 0$ and zero otherwise, compute the logical AND function:



Correct answer: A true, B false, C false, D true.

Type A question
Which logical function is computed by gate B in the image above, if the threshold is set to +1?
A) AND
B) XOR
C) OR
D) None of the above

Correct answer: C