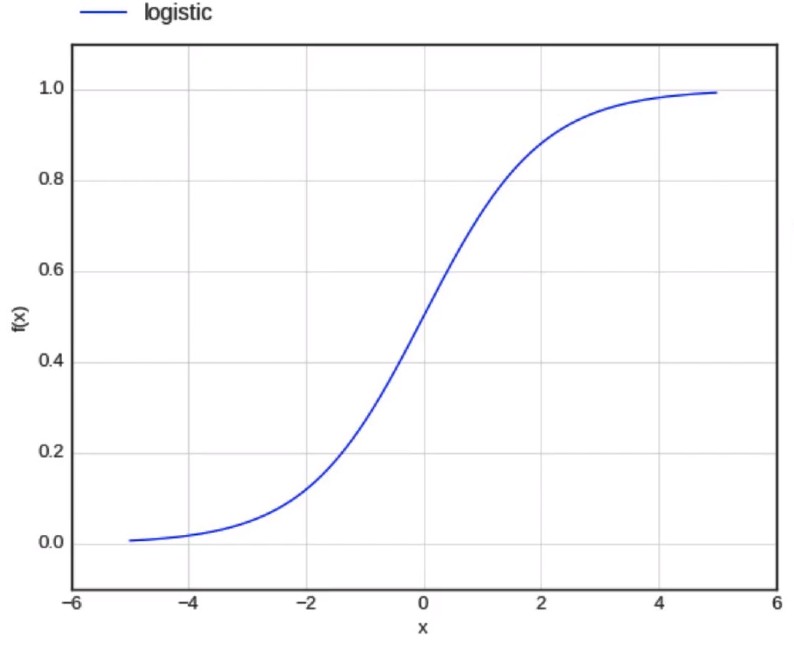
## **Saturation in logistic neuron**

Let’s look at the logistic function

1. The following figure illustrates the logistic function
2. A logistic neuron is said to be saturated when it reaches its peak values when it is given high extremes of positive or negative values as inputs.
   1. When
   2. And hence
   3. In the case where we are calculating the gradient w.r.t a weight associated with a saturated neuron, the saturated neuron’s derivative is 0, thus resulting in the entire gradient becoming 0
   4. This is because the term associated with the saturated neuron in the chain rule for gradient calculation becomes 0, thus making the entire gradient 0
   5. Due to this, the weights are not updated.
   6. This is called the **Vanishing Gradient Problem**, because the gradient vanishes or becomes 0 due to the presence of a saturated neuron.