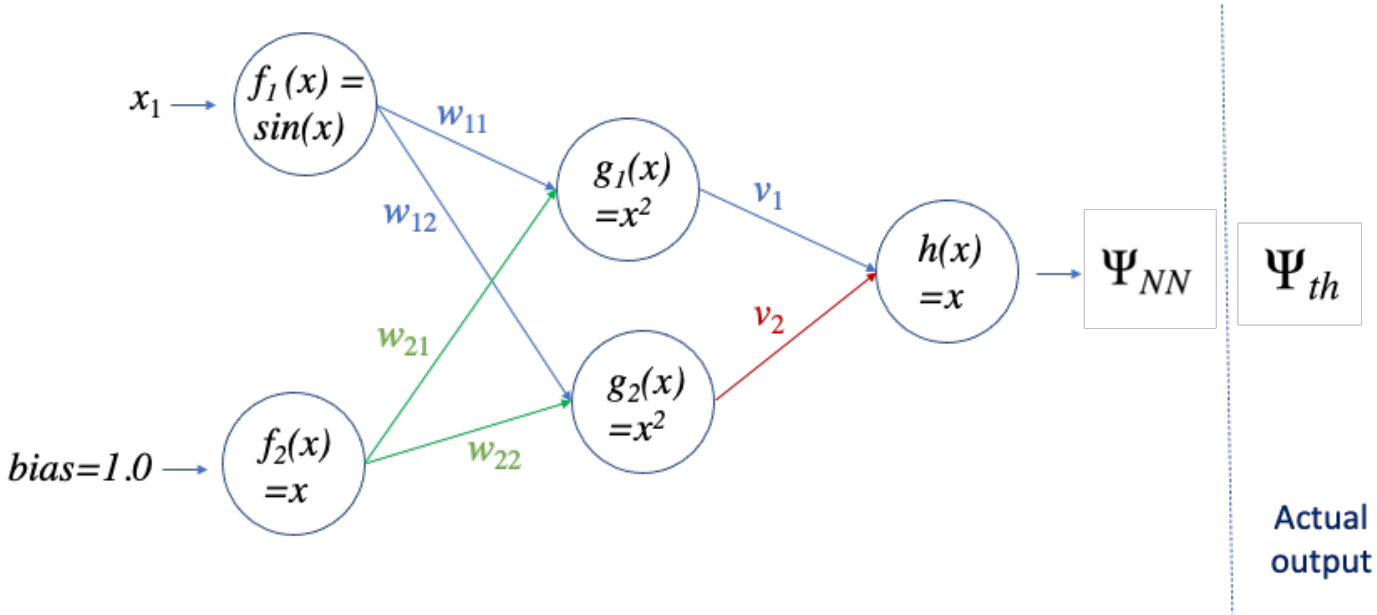
Problem 3. Gradient-Descent Backpropagation (20 pts)

Upload pdf of your solution



1A. Feed-forward propagation. Write explicitly the expressions for forward propagation for Ψ_{NN}. (**5 pts**)

1B. Weight change rule. Write explicitly the expression for the weight change rule for the following weights: w_{11}, w_{22}, v_1, v_2. Use a learning rate n=0.1 for all the weights. (**10 pts**)

1C. Actual implementation. Assuming all weights are initialized as 1.0, what is the initial estimate of the neural network $\Psi_{NN}^{(\text{iter}=0)}$ for an input given by: $x_1 = \pi/6$. (**5 pts**, all or nothing).