Problem 1. Give weights and bias for a McCulloch-Pitts (M-P) neuron with inputs $x$, $y$, and $z$, and whose output is $z$ if $x = -1$ and $y = 1$, and is -1 otherwise.

Problem 2. For this problem, change the definition of an M-P neuron so that both its inputs and output are binary. View $uv$, $wx$ as two-bit binary (0 or 1) numbers, and $yz$ as the 2 low-order bits of the numerical addition of $uv$ and $wx$.

(a) Give weights and biases for an M-P network which generates $z$.
(b) Give weights and bias for an M-P network which generates $y$.

Problem 3. Give the following 3-class classification problem:

$C_1$: $\{(4, 1), (2, 3), (3, 5), (5, 4), (1, 6)\}$
$C_2$: $\{(0, 2), (-2, 2), (-3, 2), (-2, 4)\}$
$C_3$: $\{(1, -2), (3, -2)\}$

and the following single layer perceptron:
(a) Can the net learn to separate the samples, given that you want: if $x \in C_i$ then $y_i = 1$ and $y_j = -1$ for $j \neq i$. No need to solve for the weights, but justify your answer.

(b) Add the sample $(-1, 6)$ to $C_1$. Repeat part (a).