1. For a given training dataset, suppose the learned logistic regression model is the plane $F_1 + F_2 - 2\,F_3 = 0$. For the following two test examples, compute their predicted probabilities in class 1.

Objects	F_1	F_2	F_3
A	1	2	5
B	3	4	2

Answer:

a) Let p = Pr (Label = 1 | A). Then $\log [p/(1-p)] = F_1 + F_2 - 2\,F_3$. Plug in the feature values of A; we get $\log [p/(1-p)] = 1 + 2 - 10 = -7$. Thus, $[p/(1-p)] = e^{-7}$. Thus, $p = e^{-7}/(1+ e^{-7}) < 0.001$.

b) Similarly, let p = Pr (Label = 1 | A). Plug in the feature values of B; we get $\log [p/(1-p)] = 3 + 4 - 4 = 3$. Thus, $p = e^3/(1+ e^3) = 0.95$.